

Reference

RESCINDED Per DA Circular

310-15; 30 May 1979

FM 6-60

Reference

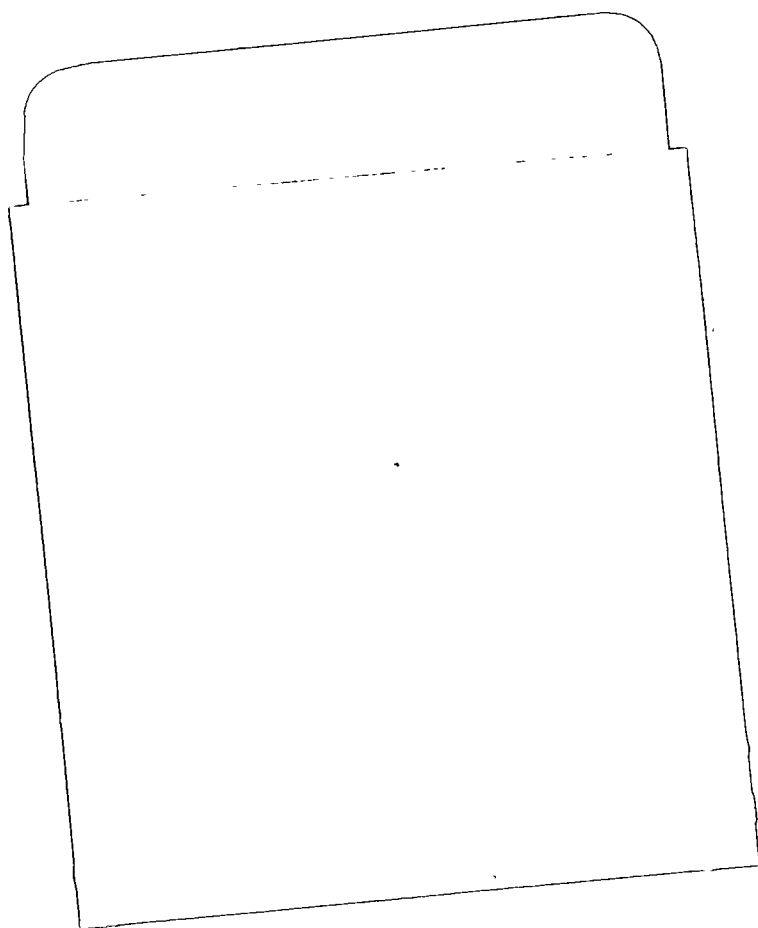
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DEPARTMENT OF THE ARMY FIELD MANUAL

**FIELD ARTILLERY ROCKET
HONEST JOHN
WITH LAUNCHER M289**



**HEADQUARTERS, DEPARTMENT OF THE ARMY
DECEMBER 1964**



CHANGE }

No. 2 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 22 July 1969

FIELD ARTILLERY ROCKET, HONEST JOHN, WITH LAUNCHER M289

FM 6-60, 29 December 1964, is changed as follows:

Page 2, paragraph 1a. Beginning in line 6, the last sentence is changed to read "The material presented herein is in consonance with International Standardization Agreement STANAG 2113, Destruction of Military Technical Equipments, and is applicable to both nuclear and nonnuclear warfare."

Page 2. Paragraph 2 is superseded as follows:

2. Changes or Comments

Users of this publication are encouraged to submit recommended changes and comments to improve the publication. Comments should be keyed to the specific page, paragraph and line of the text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications) and forwarded direct to the Commandant, U.S. Army Field Artillery School, ATTN: AKPSIAS-PL-FM, Fort Sill, Oklahoma 73503.

Page 4. Paragraph 7g is superseded as follows:

g. Radiotelephone Operator. The radiotelephone operator drives the platoon commander's vehicle, records firing data, and performs other duties as directed by the platoon commander or the chief of section.

Page 5, paragraph 11a. In line 2, "executes" is changed to read "execute."

Page 10. Paragraph 19c is superseded as follows:

c. Position vehicles according to the terrain of the loading point. There is no set procedure for

positioning the trailer, launcher and wrecker. It is desirable, however, to select positions which minimize the distance that the wrecker boom must be extended to accomplish the loading operation. The maximum safe load radius of the wrecker boom is the horizontal distance measured from the center line of the pivot post to the center line of the hoist hook. This maximum safe load radius for the M62 or M543 wrecker is 13 feet 6 inches when loading a complete MGR-1A rocket and 15 feet 6 inches when loading a complete MGR-1B rocket. An example of vehicle positions is shown in figure 5.

Pages 13 and 14. Paragraph 24d is rescinded.

Page 15. Paragraph 25d is superseded as follows:

d. Sets a Deflection to an Alternate Aiming Point After the Launcher Has Been Laid. The aiming circle normally will be used as an aiming point; however, the platoon commander may select an aiming point other than the aiming circle. For example, he may command AIMING POINT, LONE TREE, REFER. At this command, the gunner refers the sight to the lone tree and reports the deflection to the platoon commander.

Page 15, paragraph 26a(1). In line 6, "quadrant frame" is changed to read "frame of the gunner's quadrant."

Page 17, paragraph 30. In the title and in lines 1, 6, and 9 "CEASE FIRING" is changed to read "CHECK FIRE."

Page 17, paragraph 31. In line 3 "CEASE FIRING" is changed to read "CHECK FIRE."

Page 18. Paragraph 33e is superseded as follows:

e. Specific temperature limits are as follows:

	MGR-1A rocket	MGR-1B rocket
Firing-----	M3A1 motor assembly----- 0° to 100° F	— 30° to 120° F
Handling-----	M3A1C or M3A2 motor assembly----- 0° to 120° F	— 40° to 120° F
Storage-----	0° to 120° F	— 65° to 130° F
	— 10° to 120° F	

Notes. (1) Although the operational firing temperature limits for the MGR-1B rocket are from -30° to 120° F., a decrease in the performance reliability of the M66 and M66A1 rocket motors can be expected at temperatures above 100° F. At 120° F., the reliability is 91 percent with an assurance of 90 percent.

(2) The MGR-1A rocket (M3-series rocket motor) must not be moved when exposed to temperatures from 0° to -10° F. An MGR-1A rocket exposed to temperatures below -10° F. or above $+120^{\circ}$ F. for more than 12 consecutive hours must be reported to the Commanding General, U.S. Army Missile Command, ATTN: AMSMI-SMEA, Redstone Arsenal, Alabama 35809.

(3) The MGR-1B rocket (M66-series rocket motor) must not be moved when exposed to temperatures from -40° to -65° F. or from 120° to 130° F.; however, it can be stored at temperatures from 120° to 130° F. for up to 10 consecutive days. When absolutely necessary, the rocket motor assembly may be exposed to temperatures between $+130^{\circ}$ and $+165^{\circ}$ F. for not more than 8 hours. An MGR-1B rocket exposed to temperatures below -65° F. or above 130° F. must be reported to the Commanding General, U.S. Army Missile Command, ATTN: AMSMI-SMEA, Redstone Arsenal, Alabama 35809.

Page 18. Paragraph 35 is superseded as follows:

35. Installation and Removal of the Heating Blankets

Installation and removal of the heating blankets are accomplished by the crewmen, supervised by the chief of section. Blanket sections A, B, C, D, E, F, G1, G2, G3, and H are used on an assembled MGR-1A rocket. Sections A, B, C, D, E, F, H, and K are used on an assembled MGR-1B rocket. Section J is used on the front of either rocket motor when the warhead is removed. Section K is used instead of sections G1, G2, and G3 on the MGR-1B rocket motor. Section K must be removed to install the fins. The procedures for installing and removing the heating blankets is published in TM 9-1055-202-10.

Page 20. Paragraph 40c is superseded as follows:

c. Plumb Line. The use of a plumb line in performing the basic periodic test is essential to obtain maximum accuracy. The farther from the launcher that the plumb line is placed, the longer the line must be. Weights, such as wrenches or rocks, may be used to keep the line taut. The tendency of the weight to swing may be decreased by placing a bucket containing water or other liquid under the plumb line so that the weight is suspended in the

liquid. A plumb line suspended from a building or tree is most desirable and should be used if possible. Units in garrison may find it convenient to rig a permanent plumb line on a building. Another method used with success is to position a second launcher head-on toward the launcher being tested. A plumb line is attached to the top of the beam of the second launcher, and the beam is elevated to its maximum elevation.

Page 21. Paragraph 44a is superseded as follows:

a. Accurately cross-leveling the launcher, by tracking a plumb line (aiming point). The launcher is cross-leveled by operating the cross-leveling handwheel. Cross-leveling is accomplished when the launcher beam tracks a plumb line, and the bottom carriage level assembly bubble remains centered. If the bubble deviates by more than one vial graduation while tracking the plumb line, the bottom carriage level assembly is out of tolerance and the launcher should be sent to an ordnance unit for adjustment or repair of the bottom carriage level assembly.

Note. The cross-leveling operation should be carefully checked, since the tests prescribed in paragraphs 45 through 52 are dependent on the trunnions being accurately leveled at all times. To insure accuracy, the cross level should be checked by tracking the plumb line periodically throughout the test. One method of doing this is to check the track at 200-mil intervals throughout the elevation range to insure that the launcher beam actually tracks the plumb line throughout its entire elevation capability.

Page 23. Paragraph 51c is superseded as follows:

c. Vertical Alinement Test of Telescope Mount. Set the launcher beam at zero elevation, using jacks as required to raise the rear of the launcher. Level the telescope mount bubbles. Operate the cross-leveling knob throughout its range of rotation. The longitudinal-level bubble should remain centered within one-half vial graduation.

Note. The launcher must be emplaced on a forward slope to perform this test. The beam must be depressed 88 mils from its lowered position (launcher on level ground) in order to be made horizontal. Of this amount, up to 53 mils may be accrued by use of the leveling jacks after the launcher is emplaced on a forward slope. A minimum forward slope of 35 mils is therefore required.

Page 23, paragraph 51e. In line 8, "1 mil" is changed to read "one-half mil."

Page 23. Paragraph 52b is rescinded.

Page 26, paragraph 56. In line 7, "ordnance" is changed to read "maintenance."

Page 26, paragraph 58. In line 3, "LO 9-3060" is changed to read "LO 9-1055-202-10."

Page 26, paragraph 60. In line 1, "First-echelon" is changed to read "Organizational."

Page 27, paragraph 60c. In line 2, "moments" is changed to read "moment's."

Page 30. Chapter 9 is superseded as follows:

CHAPTER 9

DESTRUCTION OF EQUIPMENT (STANAG 2113)

65. General

a. Tactical situations may arise in which it is necessary to abandon equipment in a combat zone. In such a situation, it is essential that all military technical equipment be destroyed to the maximum degree possible to prevent its eventual use by the enemy.

b. *Equipment will be destroyed only on the authority of a division or higher commander or on the order of a person who has been delegated such authority. Usually, such authority will be delegated to the senior military person present in the unit.*

66. Plans

An adequate, uniform, and easily executed plan will be prepared by each battery to expedite destruction of equipment. The following principles must be considered in developing the plan:

a. Priority must always be given to the destruction of classified material. Such destruction must, to the maximum extent possible, prevent duplication of the material by the enemy and must deny equipment operational or functional information to the enemy.

b. When complete destruction of abandoned equipment is not possible, priority must be given to the destruction of all essential components (including spare parts) of a like kind, in order to render the equipment useless and prevent its restoration by cannibalization.

c. Destruction must be as complete as possible.

d. The same essential parts must be destroyed throughout the battery.

e. Spare parts and accessories must be given the same priority as those installed on the equipment.

67. Methods

a. The most generally applicable methods of destruction are—

(1) *Mechanical*—Requires axe, pick, sledge, or similar equipment.

(2) *Burning*—Requires gasoline, oil, or other flammables.

(3) *Demolition*—Requires ammunition or explosives.

(4) *Gunfire*—Requires artillery, rocket launcher, or rifle grenades.

b. In general, the destruction of essential parts, followed by burning, is sufficient to render the item useless.

c. Destruction of the 762-mm rocket involves the destruction of the highly sensitive propellant. For detailed methods of destruction, see TM 9-1340-202-12. If the nuclear warhead section is also to be destroyed, refer to TM 9-1100-200-12.

d. Denial of nuclear weapons to the enemy is of paramount importance. The most desirable form of denial is removal of the weapon from the threatened area. The next most desirable form of denial (if authorized) is gainful and expeditious employment of the weapon against the enemy. The least desirable form of denial is destruction of the weapon.

Page 32. Paragraph 71 is superseded as follows:

71. Misfires and Hangfires

a. A misfire is a failure of the propellant grain to ignite when the firing circuit is completed. A hangfire is a temporary failure to function; that is, a delay occurs between the completion of the firing circuit and the ignition of the propellant. A misfire or hangfire may be caused by failure of the electrical power source, faulty connections in the firing circuit, or a faulty igniter.

b. Since the difference between a misfire and a hangfire cannot be distinguished immediately, any failure to fire will be regarded as a hangfire until a 30-minute safety interval has elapsed. After the

safety interval has elapsed, the rocket should be disarmed in accordance with TM 9-1340-202-12. After the rocket has been disarmed, all electrical circuits should be tested in accordance with TM 9-1340-202-12.

Page 36, paragraph 86. On the line for section VI, "deffection" is changed to read "deflection."

Page 36, paragraph 88a. In line 1, "shifting" is changed to read "repositioning."

Page 36. Paragraph 88f is added.

f. For the purpose of these tests, the initial aiming point will be the aiming circle. A deflection of 2,800 mils will be set on the scales of the panoramic telescope.

Page 36, paragraph 89. Under *Action of Candidate* column, in line 1, "longitudial-level" is changed to read "longitudinal-level."

Page 42. Appendix I is superseded as follows:

APPENDIX I REFERENCES

AR 310-25-----	Dictionary of United States Army Terms.
AR 385-62-----	Firing Guided Missiles and Heavy Rockets for Training, Target Practice, and Combat.
AR 611-201-----	Enlisted Military Occupational Specialties.
AR 750-5-----	Organization, Policies, and Responsibilities for Maintenance Operations.
ATP 6-302-----	Field Artillery Rocket Units, Honest John and Little John rocket.
ATT 6-175-----	Field Artillery Battalion (Battery), Honest John and Little John rocket.
DA Pam 108-1-----	Index of Army Motion Pictures and Related Audio-Visual Aids.
DA Pam 310-series	Indexes of Military Publications.
FM 1-100	Army Aviation Utilization.
FM 5-15	Field Fortifications.
FM 5-20	Camouflage.
FM 5-25	Explosives and Demolitions.
FM 6-20-2	Field Artillery Techniques.
FM 6-40	Field Artillery Cannon Gunnery.
FM 6-40-1	Field Artillery Honest John/Little John Rocket Gunnery.
FM 6-61	Field Artillery Battalion, Honest John.
FM 6-125	Qualification Tests for Specialists, Field Artillery.
FM 6-140	Field Artillery Cannon Battalions and Batteries.
FM 21-5	Military Training Management.
FM 21-30	Military Symbols.
FM 21-40	Chemical, Biological, Radiological and Nuclear Defense.
FM 21-60	Visual Signals.
FM 22-5	Drill and Ceremonies.
FM 31-36 (TEST)	Night Operations.
FM 31-70	Basic Cold Weather Manual.
LO 9-1055-202-10	Launcher, Rocket: 762-mm, Truck-Mounted, M289.
TB 9-1000-212-20	Launcher, 762-mm Rocket, Truck-Mounted, M289, and M386: Inspection Procedures and Straightness Standards for Launching Beam of Materiel in Hands of Troops.
TM 3-220	Chemical, Biological, and Radiological (CBR) Decontamination.
TM 5-200	Camouflage materials.
TM 9-238	Deepwater Fording of Ordnance Materiel.
TM 9-247	Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Materiel; and Related Materials Including Chemicals.

TM 9-1055-202-10	Operator's Manual: Truck-Mounted 762-mm Rocket Launcher M289.
TM 9-1055-202-20	Organizational Maintenance Manual: Truck-Mounted 762-mm Rocket Launcher M289.
TM 9-1055-203-15	Operation and Maintenance: Truck-Mounted 762-mm Rocket Heating and Tiedown Unit M78A1.
(S) TM 9-1100-200-12	Operator and Organizational Maintenance Manual (Prelaunch Procedures): Honest John Atomic Warhead Section, M27, M47, M48, and Training Warhead Section M72 (U).
TM 9-1300-206	Care, Handling, Preservation and Destruction of Ammunition.
TM 9-1340-202-12	Operator and Organizational Maintenance Manual: 762-mm Rockets MGR-1A and MGR-1B (Honest John Rocket System).
TM 9-1375-200	Demolition Materials.
TM 9-1527	Ordnance Maintenance: Gunner's Quadrants M1 and M1918 and Machinegun Clinometer M1917.
TM 9-1900	Ammunition, General.
TM 9-2320-209-10	*Operator's Manual: 2½-ton, 6x6: Chassis, Truck.
TM 9-2320-209-20	*Organizational Maintenance Manual for 2½-ton, 6x6, Chassis, Truck.
TM 9-2320-211-10	*Operator's Manual: for 5-ton, 6x6 Truck, Chassis.
TM 9-2320-211-20	*Organizational Maintenance Manual for: 5-ton, 6x6 Truck, Chassis.
TM 9-2330-223-14	Operator, Organizational, Direct and General Support Maintenance Manual (Including Repair Parts and Special Tool Lists) for Trailer, Rocket Transporter, 762-mm Rocket, M329 (2330-046-1733), M329A1 (2330-508-1483), and M329A2 (2330-738-5871).
TM 9-6103	Ordnance Maintenance: Telescope Mounts M3A1, M18A1, M21A1, M25, M30, M44, M44A1, M69, and M76.
TM 9-6147	Ordnance Maintenance: Panoramic Telescopes; M12A7C, M12A7D, M12A7F, M12A7G, M12A7H, and M12A7K (M12A7E4).
TM 11-6660-203-20P	Organizational Maintenance Repair Parts and Special Tool Lists: Wind Measuring Sets AN/MMQ-1, AN/MMQ-1A, AN/MMQ-1B, AN/PMQ-6, and AN/PMQ-6A.
TM 21-300	Driver Selection and Training (Wheeled Vehicles).
TM 21-305	Manual for the Wheeled Vehicle Driver.
TM 38-750	Army Equipment Record Procedures.
TOE 6-175	Field Artillery Battalion, Honest John, Armored Division; or Field Artillery Battalion, Honest John, Infantry Division; or Field Artillery Battalion, Honest John, Infantry Division (Mechanized).
TOE 6-525	Field Artillery Battalion, Honest John.

*Refer to DA Pam 310-4 for complete listing of trucks covered by this manual.

Page 45, paragraph 6. In line 3, "M78" is changed to read "M78A1."

Table I. Under the Gunner Column, sequence 4 and sequence 6 are rescinded.

C 2, FM 6-60

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-11 requirements for Field Artillery Rocket,
Honest John with Launcher M289.



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CHANGE

No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 11 February 1965

FIELD ARTILLERY ROCKET, HONEST JOHN, WITH LAUNCHER M289

FM 6-60, 29 December 1964, is changed as follows:

Insert the attached Tables I through VII in the back of the manual.

By Order of the Secretary of the Army:

Official:

J. C. LAMBERT,
*Major General, United States Army,
The Adjutant General.*

HAROLD K. JOHNSON,
*General, United States Army,
Chief of Staff.*

Distribution:

Active Army:

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Br Svc Sch (2) except
USAAMS (25)
Units org under fol TOE:
6-175 (4)
6-177 (6)
6-302 (4)
6-525 (4)
6-527 (6)

NG: State AG (3)

USAR: Same as Active Army except allowance is one copy to each unit.

For explanation of abbreviations used, see AR 320-50.



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Table 1. Loading with the Wrecker

Sequence	Chief of section	Gunner	No. 1	No. 2 (driver)	No. 3	No. 4	No. 5	No. 6	Senior assembly specialist	Assembly specialists
1	Directs vehicles into proper position for loading.	Assists chief of section.		Positions launcher as directed.	Set trailer brakes, lower trailer landing jack and disconnect trailer from wrecker.				Supervises assembly specialists.	
2			Lowers right front wrecker outrigger.	Lowers left front wrecker outrigger.	Unlocks traveling clamps on trailer.	Assists No. 3.	Lowers right rear wrecker outrigger.	Lowers left rear wrecker outrigger.	Removes cab top and lowers windshield and mirror.	Installs fins on rocket (when necessary).
3			Releases right stabilizing arm on wrecker boom.	Releases left stabilizing arm on wrecker boom.	Disconnects electric heating blankets.		Installs handling beam on rocket (when directed).			Places right rear launcher platform assembly in extended position.
							Centers lifting clamp assembly on handling beam.	Attaches guide ropes to handling beam.		
4	Directs operations of the wrecker operator when handling the rocket.	Positions drawbar on launching beam.	Handles right front guide rope on handling beam.	Handles left front guide rope on handling beam.	Handles right rear guide rope on handling beam.	Handles left rear guide rope on handling beam.	Attaches hook to handling beam.	Positions lifting clamp assembly on handling beam.		Removes ladder assembly from right front fender and positions under rear of launcher beam.
5		Guides rear shoes of rocket on the launcher beam.								Guides front shoes into slot on launcher rail.
6		Jacks rocket into position. Secures the drawbar to the rear shoes of the rocket.					Removes handling beam from rocket and stores it assisted by No. 6.	Assists No. 5 in removing and storing handling beam. Removes guide ropes from handling beam.		
7		Positions left rear traveling clamp in traveling position and installs strap assembly.	Raises right front wrecker outrigger.	Raises left front wrecker outrigger.		Positions left front and center traveling clamps and installs strap assemblies.	Raises right rear wrecker outrigger.	Raises left rear wrecker outrigger.		Positions right front, center and rear traveling clamps and installs strap assemblies.
8	Connects electric blankets when required.	Replaces left rear launcher platform assembly in traveling position.	Secures right stabilizing arm on wrecker boom.	Secures left stabilizing arm on wrecker boom.						Replaces right rear launcher platform assembly in traveling position, replaces ladder.

Table 1

Table II. Duties in Preparation for Action

(1) AN/MMQ-1 Windset

Sequence	Chief of section	Gunner	No. 1	No. 2 (driver)	No. 3	No. 4	No. 5	No. 6 (driver)	Senior assembly specialist	Assembly specialist 1	Assembly specialist 2
1	Directs launcher, section truck and low-level wind equipment into position.			Positions launcher as directed and sets brake.	Distributes jack handles.		Directs No. 6 in positioning windset equipment.	Unloads section equipment at launcher and positions windset equipment as directed.	Checks tools and equipment at launcher section.		
2	Directs rough leveling of launcher. Checks cross-leveling with the gunner's quadrant.	Assists No. 1 in emplacing rear leveling jack float. Removes traversing arc cover (left side).	Emplaces rear leveling jack float. Operates rear leveling jacks.	Unlocks launcher beam traveling lock, installs boresight assembly and assists in emplacing front leveling jack floats.	Emplaces right-center leveling jack float. Operates right center leveling jack.	Emplaces left-center leveling jack float. Operates left-center leveling jack.	Sets wind equipment parking brakes. Lowers and locks support legs and jacks. Disconnects safety chains and disengages lunette.	Unloads windset equipment and removes vehicle to motor park.	Emplaces front leveling jack floats. Operates front leveling jacks assisted by No. 2.	Assists No. 3 in emplacing right-center leveling jack float. Removes traversing arc cover (right side).	Assists No. 4 in emplacing left-center leveling jack float.
3	Insures that gunner identifies the proper aiming point.		Checks to insure power elevation lock handle engaged. Directs No. 2 in power elevating.	Elevates launcher beam to clear traversing lock as directed by No. 1.	Removes right equilibrator retaining pin.	Removes left equilibrator retaining pin.	Removes cover from wind measuring set. Assembles windspeed transmitter and secures to mast.	Lowers front jack of windset trailer. Assists No. 5.		Unlocks right traverse lock.	Unlocks left traverse lock.
4	Measures site to mask when required. (Normally done prior to occupation of position.)	Assists No. 4 in placing tarpaulin at left of launcher.				Places tarpaulin at left of launcher.	Attaches signal transmission cable to mast.	Puts out guy cables and stakes.		Places center and forward traveling clamps in firing position assisted by assembly specialist 2.	Assists in placing center and forward traveling clamps in firing position.
5	Supervises work of section.	Determines that cross-leveling of launcher has been completed.				Lays firing line to firing station.	Attaches guy cables to mast. Levels trailer.	Assists No. 5 in leveling trailer.	Begins checkout of rocket motor and firing circuit as directed.	Assists senior assembly specialist in checkout procedures.	Assists senior assembly specialist in checkout procedures.
6		Mounts and levels panoramic telescope.	Performs duties as directed.	Power elevates and depresses the launcher beam as directed.	Performs duties as directed.		Raises mast to upright position and clamps in place.	Assists No. 5 in raising mast and clamping mast in position. Starts PE-75.	Installs fins if necessary assisted by 2 assembly specialists.	Assists in installing fins if necessary.	Assists in installing fins if necessary.
7	Checks boresighting.	Boresights and zeroes the sight.					Lays mast for direction. Raises mast.	Assists No. 5 in laying mast and in raising mast.			
8		Places rear traveling clamp in firing position.		Removes and stows boresight assembly.					Reads and reports propellant temperature to chief of section.		
9	Reports referred deflection, site to mask, and propellant temperature to FDC. Reports to platoon commander when prepared for action.	Lays launcher for direction.					Lays transmission cable to fire-control point. Calibrates data indicator box at fire-control point.	Lays wire line from fire control point to windset. Installs telephone at windset.			

Table III. Duties in Preparation for Action

(2) AN/PMQ-6 Windset

Sequence	Chief of section	Gunner	No. 1	No. 2 (driver)	No. 3	No. 4	No. 5	No. 6 (driver)	Senior assembly specialist	Assembly specialist 1	Assembly specialist 2
1	Directs launcher section truck and low-level wind wind equipment into position.			Positions launcher as directed and sets brakes. Installs boresight assemblies.	Directs windset vehicle into position.		Distributes jack handles.	Positions windset vehicle as directed.	Checks tools and equipment at launcher position.		
2	Directs rough leveling of the launcher. Checks cross leveling with the gunner's quadrant.	Assists No. 1 in emplacing rear leveling jack float. Removes traversing arc cover (left side).	Emplaces rear leveling jack float. Operates rear leveling jack.	Unlocks launcher beam traveling lock, and assists in emplacing front leveling jack floats.	Assisted by No. 6, unloads windset equipment. Places head of mast on indicator box with mast base pointed into wind with two base legs up.	Emplaces left-center leveling jack float. Operates left-center leveling jack.	Emplaces right-center leveling jack float. Operates right-center leveling jack.	Assists No. 5 in unloading equipment and placing head of mast on indicator box.	Emplaces front leveling jack floats. Operates front leveling jacks assisted by No. 2.	Assists No. 5 in emplacing and operating right-center leveling jack float. Removes traversing arc cover (right side).	Assists No. 4 in emplacing and operating left-center jack float.
3	Insures that gunner identifies proper aiming point.		Checks to insure power elevation lock handle engaged. Directs No. 2 in power elevating.	Elevates launcher beam to clear traveling lock as directed by No. 1.	Removes protective cap. Assembles windspeed transmitter and attaches to mast. Attaches signal transmission cable to transmitter.	Removes left equilibrators retaining pin.	Removes right equilibrators retaining pin. Reports to wind measuring set location.	Loosens support leg locking. Releases support leg retaining levers. Extends two base legs. Swings two support legs from mast and clamps to base legs.		Unlocks right traverse lock.	Unlocks left traverse lock.
4		Assists No. 4 in placing tarpaulin at left of launcher.		Lays firing line to firing station.		Places tarpaulin at left of launcher. Reports to windset location.	Removes mounting feet from guy accessories case; places for use by No. 6. Attaches long guys to upper guy rings.	Mounts two mounting feet in two extended base legs.		Places center and forward traveling clamps in firing position assisted by assembly specialist 2.	Assists in placing center and forward traveling clamps in firing position.
5	Supervises work of section. Measures site to mask when required.	Determines that cross-leveling of launcher has been completed.	Performs duties as directed.	Power elevates the launcher beam as directed.	Places indicator box at fire control point.	Attaches short guys to lower guy rings. Assembles pump box.	Assists No. 6 in erecting mast to vertical position. Extends guys away from mast.	Erects mast to vertical position assisted by No. 5. Obtains guy stakes, stake heads and sledge hammer.	Begins checkout of rocket motor and firing circuit.	Assists senior assembly specialist.	Lays wire line from firing station to launcher. Installs telephone at launcher.
6		Mounts and levels panoramic telescope.		Removes vehicle to motor park.	Lays windset mast for direction.	Turns and locks base plate. Levels mast.	Extends third base leg, clamp support leg to base leg. Mounts mounting foot. Lowers and tightens support leg lock ring.	Drives guy stakes 50 feet from mast on line with base legs.	Continues checkout of rocket motor and firing circuit.	Assists senior assembly specialist.	Assists senior assembly specialist.
7	Checks boresight.	Boresights and zeroes the sight.	Removes boresight assemblies. Places rear traveling clamps in firing position.		Attaches transmission cable and indicator box to junction box. Lays transmission cable to fire control plant.	Attaches airhose to mast. Raises mast by operating pump. Assists No. 6 when relieved by No. 5.	Assists No. 6. Relieves No. 4 on pump.	Extends guys. Attaches short guys to guy stakes as third mast section is raised to maximum and attaches long guys to stakes when mast is fully raised.			
8		Lays launcher for direction.			Calibrates data indicator box. Connects indicator transmission cable to data indicator box.	Assists No. 6.	Lays wire line from fire control point to windset. Installs telephone at windset.	Tightens guys and checks level assisted by numbers 4 and 5.	Reads and reports propellant temperature to the Chief of Section.		
9	Reports referred deflection, site to mask, and propellant temperature to the FDC. Reports to the Platoon Commander when prepared for action.				Improves position.	Improves position.	Improves position.	Moves vehicle to motor park and improves position.			

Table IV. Duties in Firing

Sequence	Chief of section	Gunner	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	Senior assembly specialist	Assembly specialist 1	Assembly specialist 2
1	Follows fire commands. Supervises section. Announces initial deflection and quadrant elevation.	Lays launcher on initial deflection.	Lays launcher on initial quadrant elevation. Directs No. 2 in power elevation.	Power elevates launcher as directed by No. 1.	Records low-level data. Computes corrections for low-level wind. Announces wind corrections to the section commander.	Performs duties as directed.	Assists No. 3 as required.		Nonnuclear: Completes checkout of rocket motor and firing circuit as directed. Nuclear: Performs duties in accordance with TM 9-1100-200-12. Supervises activity of assembly specialists.		
2	Reports mistakes or unusual incidents to platoon commander.	Removes thermometer and places in case.	Pulls all quick release devices to remove electric blankets.	Removes blankets from left side assisted by No. 6.		Assists No. 5 in removing electric blankets (right side).	Removes electric blankets from right side assisted by No. 4.	Assists No. 2 in removing blankets (left side).			
3									Assisted by the assembly specialists completes checkout and preparation of the rocket motor for firing.	Assists the senior assembly specialist to checkout and prepare the rocket motor for firing.	Assists the senior assembly specialist to checkout and prepare the rocket motor for firing.
4	Checks initial deflection, time and quadrant elevation. Insures that pedestal access doors are secured, spin rocket ignition switch installed, travel locks pinned in the firing position, pins removed from front and rear launching shoes (MGR-1B), lanyard attached (MGR-1A), launcher is cross-leveled, sight is removed, and launcher is secure.	Lays launcher on final deflection.	Lays launcher on final quadrant elevation (directs No. 2 in power elevation. Fine adjusts using handwheel.) Supervises No. 2 in cross-leveling launcher beam.	Power elevates as directed by No. 1. Cross levels launcher beam using cross-level handwheel as directed by No. 1.					Fuzes and arms the rocket.		
5		Removes panoramic telescope and places in storage case.	Removes telephone from blast area.					Replaces ladder assembly on right front fender.			
6	Upon receipt of reports from gunner, No. 2, and senior assembly specialist, reports to platoon commander ready to fire.	Reports launcher laid and ready to fire.		Reports launcher safe to fire.					Reports rocket ready to fire.	Conducts final continuity check of firing circuit.	
7	Supervises firing sequence. Reports to FDC: Deflection, QE, and time fired.									Fires rocket on order.	

Table IV

Table V. Duties in March Order
(AN/MMQ1 Series Windset)

Sequence	Chief of section	Gunner	No. 1	No. 2 (driver)	No. 3	No. 4	No. 5	No. 6 (driver)	Senior assembly specialist	Assembly specialist 1	Assembly specialist 2
1	Inspects equipment for loss or damage. Supervises work of section.	Traverses launching beam to center.	Directs No. 2 in power depression of beam.	Depresses launcher beam to traveling lock. Assists senior assembly specialist in securing front jack floats.	Replaces right equilibrator retaining pin.	Raises left-center jack to traveling position and places float on launcher (assisted by assembly specialist 2).	Prepares data indicator box for travel and carries it to wind measuring set location.	Moves vehicle to position for loading. Disconnects firing panel box.	Raises front jacks to traveling position and places floats on launcher (assisted by No. 2). Prepares tools and equipment for traveling.		Assists No. 4 in securing left-center jack float.
2		Places panoramic telescope in its traveling case.	Secures launcher rear travel locks.			Replaces left equilibrator retaining pin.	Lowers mast.	Takes out stakes, guys and cables.		Secures right traverse lock.	Secure left traverse lock.
3		Hand depresses beam into travel lock (last few mils). Replaces traverse arc cover (left side).	Raises rear jack to traveling position and places float on launcher (assisted by gunner).		Raises right-center jack to traveling position and places float on launcher (assisted by assembly specialist 1).		Folds mast to traveling position (assisted by No. 6).	Assists No. 5 in securing mast.		Assists No. 3 in securing right-center jack float.	
4		Assists No. 1 in placing rear jack float on launcher.					Detaches and disassembles wind-speed transmitter. Packs wind-speed transmitter.	Packs stakes, guys, and cables.		Replaces traversing arc cover (right side). Recovers wire line from firing station to launcher. Loads wire and telephone.	Recovers wire line from aiming circle to firing station.
5						Recovers firing cable.	Detaches signal transmission cable. Assisted by No. 6 raises rear jack. Replaces cover.	Raises front jack. Assists No. 5 in replacing cover.			
6							Connects lunette to vehicle. Fastens safety chain. Raises support leg. Releases brakes.	Recovers wire line from fire control point to windset. Loads telephone and wire.			
7		Directs loading of equipment.	Assists in loading equipment as directed.	Checks launcher and reports to chief of section when ready to move.	Assists in loading equipment as directed.	Assists as directed.	Reports to chief of section when ready to move.	Moves vehicle to launcher position.	Reports to chief of section when ready to move.	Assists as directed.	Assists as directed.
8	Upon receipt of reports from No. 2, No. 5 and senior assembly specialist, reports to platoon commander when ready to move.										

Table V

Table VI. Duties in March Order
(AN/PMQ-6 Windset)

Sequence	Chief of section	Gunner	No. 1	No. 2 (driver)	No. 3	No. 4	No. 5	No. 6 (driver)	Senior assembly specialist	Assembly specialist 1	Assembly specialist 2
1	Inspects equipment for loss or damage. Supervises work of section.	Traverse launching beam to center.	Directs No. 2 in power depression of beam.	Depresses launching beam to travel lock. Assists senior assembly specialist in securing front jack floats.	Prepares data indicator box for travel and carries it to windset location.	Raises left-center jack to traveling position and places float on launcher (assisted by assembly specialist 2).	Replaces right equilibrator retaining pin. Assists assembly specialist 1 in securing right-center jack float. Reports to windset.	Moves vehicle to position for loading. Disconnects firing panel box.	Raises front jacks to traveling position and places floats on launcher (assisted by No. 2).	Raises right-center jack to traveling position and places float on launcher (assisted by No. 5).	Assists No. 4 in securing left-center jack float.
2		Places panoramic telescope in traveling case.	Secures launcher rear travel locks.	Secures left traverse lock.	Recovers indicator transmission cable and stores in case.	Replaces left equilibrator retaining pin. Reports to windset.	Removes guys and guy stakes	Recovers wire line from aiming circle to firing station.	Prepare tools and equipment for traveling.	Secures right traverse lock.	Secures left traverse lock.
3		Hand depresses beam into travel lock (last few mils). Replaces traverse arc cover (left side).	Raises rear jack to traveling position and places float on launcher (assisted by gunner).		Recovers signal transmission cable and stores in case.	Lowers mast. Removes air-hose from mast.	Pulls guy stakes and stores in accessory case.	Disassembles pump box.		Replaces traverse arc cover (right side).	Recovers wire line from firing station to launcher. Loads wire and telephone.
4		Assists No. 1 in replacing rear jack float on launcher.				Assists No. 5	Recovers guys and stores in accessory case (assisted by No. 4).			Recovers firing cable.	
5						Unlocks and turns baseplate; loosens support leg lockring; unclamps one support leg and folds support leg and base leg to mast and locks in place (assisted by No. 6.)		Assists No. 4.			
6					Disassembles and stores windspeed transmitter. Replaces protective cap. Attaches mast retaining cable.	Lowers mast to horizontal with top of mast on indicator box; unclamps and folds support legs and base legs to mast and locks in place; tightens support leg lockring (assisted by No. 6).	Recovers mounting feet and places in guy accessories case.	Assists No. 4.			
7		Directs loading of equipment.	Assists in loading equipment as directed.	Checks launcher and reports to chief of section when ready to move.	Loads windset equipment assisted by Nos. 4, 5, and 6. Reports to chief of section when ready to move.	Assists No. 3.	Assists No. 3.	Assists No. 3. Moves vehicle to launcher position.	Reports to chief of section when ready to move.	Assists in loading as directed.	Assists in loading as directed.
8	Upon receipt of reports from No. 2, No. 3 and senior assembly specialist, reports to platoon commander when ready to move.										

Table VI

Table VII. Duties in Assembly Using Wrecker

Sequence	Chief of section	Senior assembly specialist	Assembly specialist	Launcher crewman number 1	Launcher crewman number 2 (heavy truck driver)	Launcher crewman number 3 (wrecker operator)
1	Directs vehicles into position.		Sets right parking brake on trailer.	Sets left parking brake on trailer.	Positions vehicle and trailer as directed.	Positions wrecker as directed.
2	Supervises preparation for assembly.	Lowers left front wrecker outrigger.	Lowers right front wrecker outrigger.	Lowers left rear wrecker outrigger.	Lowers right rear wrecker outrigger.	Positions wrecker boom.
3		*Removes screws from lid of rocket slipping container; directs wrecker operator in removal of lid.	*Assists senior assembly specialist as required.	*Assists senior assembly specialist as required.	*Assists senior assembly specialist as required.	* Removes rocket shipping container lid using wrecker boom.
4		Assisted by the assembly specialist, removes strap assemblies from rocket.	Assists senior assembly specialist in removing strap assemblies.	Connects wrecker boom to handling beam. Installs handling beam on rocket shoes. Adjusts lifting assembly to proper center of gravity.	Assists launcher crewman number 1 in installing handling beam. Installs guide ropes on handling beam.	Operates wrecker boom to transfer handling beam to position above rocket.
5	Directs transfer of rocket. Disconnects wrecker boom from handling beam.	Handles left front guide rope on handling beam.	Handles right front guide rope on handling beam.	Handles left rear guide rope on handling beam.	Handles right rear guide rope on handling beam.	Operates wrecker boom.
6	Supervises assembly operations.	Assisted by the assembly specialist, performs inspection and electrical tests of rocket.	Assists senior assembly specialist on electrical testing of rocket. Operates ratchet to raise rollers in rocket motor saddles when it is necessary to rotate the rocket.	Installs rear shoe launcher adapters and checks with GO/NO GO gage.	Assists launcher crewman number 1 in installing rear launching shoe adapters.	Operates wrecker boom.
7				*Removes screws from lid of warhead container; directs wrecker operator in removal of lid.	*Assists launcher crewman number 1 in removal of warhead shipping container lid.	* Removes warhead shipping container lid using wrecker boom.
8				Removes strap assemblies from warhead and installs handling sling.	Assists launcher crewman number 1 in removing strap assemblies and installing handling sling.	Operates wrecker boom.
9	Directs transfer of warhead and assembly operations.	Assisted by the assembly specialist, assembles warhead to rocket.	Assists senior assembly specialist in assembling warhead to rocket.	Guides rear of warhead.	Handles front guide rope on handling sling.	Operates wrecker boom.
10	Disconnects wrecker boom from handling sling. Performs inspection of warhead.	Assists chief of section in warhead inspection.	Removes handling sling from warhead. Connects heating blankets when required.	Prepares rocket for fin installation (when directed). Installs fins.	Assists launcher crewman number 1 in installing fins.	
11		Installs strap assemblies on rocket motor and warhead.	Assists senior assembly specialist in installing strap assemblies.	Raises left wrecker outriggers.	Raises right wrecker outriggers.	

*Performed only when rocket motor and warhead are in shipping containers.

FIELD MANUAL }
No. 6-60

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 29 December 1964

FIELD ARTILLERY ROCKET, HONEST JOHN, WITH LAUNCHER M289

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* This manual supersedes FM 6-60, 7 December 1959, including C 1, 6 November 1961.

CHAPTER 1

GENERAL

1. Purpose and Scope

a. This manual is a guide to assist commanders in developing the firing and the assembly and transport (A&T) sections of Honest John rocket units into efficient teams capable of operating effectively under combat conditions. The material presented herein is applicable to both nuclear and nonnuclear warfare.

b. This manual prescribes—

- (1) General and individual duties of firing section personnel.
- (2) Section drills.
- (3) Tests and adjustments of sighting and fire control equipment.
- (4) Safety precautions.
- (5) Individual duties of assembly and transport section personnel.
- (6) Individual duties of personnel in rocket assembling and testing.
- (7) Procedures for decontamination and destruction of equipment.

c. TM 9-1100-200-12 prescribes the procedures and individual duties of crew members for the preparation and checkout of the nuclear warhead.

2. Change or Comments

Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to Commandant, U.S. Army Artillery and Missile School, ATTN: AKPSIPL, Fort Sill, Oklahoma.

3. Definitions and Terms

a. *Launcher*. When used in connection with heavy free-flight rockets, the term "launcher" normally implies just the rail and associated sighting and aiming, elevating, and traversing mechanisms necessary to fire the rocket. In this manual, the term also includes the vehicle upon which the launcher is mounted. The 762-mm rocket, self-propelled launcher discussed in this manual is designated the M289.

b. *Section*. Tables of organization and equipment prescribe the *personnel* and *equipment* comprising each section of a battery. In this manual the term "section" may apply to those *personnel* required to serve the rocket, launcher, and equipment in one section only.

4. Characteristics of Equipment

Detailed characteristics of the M289 launchers are given in TM 9-1055-202-10. The general characteristics are shown below.

a. Length overall with MGR-1A rocket—45 feet 1 inch.

b. Length overall with MGR-1B rocket—44 feet 5½ inches.

c. Height with MGR-1A rocket (fins mounted)—12 feet 7½ inches.

d. Height with MGR-1B rocket (fins mounted)—12 feet 6¾ inches.

e. Width—10 feet.

f. Weight with MGR-1A rocket—47,713 pounds.

g. Weight with MGR-1B rocket—46,519 pounds.

h. Length of launcher rail—42 feet 4 inches.

5. References

Related publications are listed in appendix I.

CHAPTER 2

ORGANIZATION

6. Composition of the Firing Section

The firing section consists of a 762-mm rocket launcher, a low-level wind measuring set (windset), ancillary equipment, and the following personnel:

- a. Platoon (section) commander.
- b. Chief of section (CS).
- c. Gunner (G).
- d. Senior assembly specialist (SAS).
- e. Two assembly specialists (AS).
- f. Six launcher crewmen, numbered 1 through 6.
 - (1) Number 2 is the launcher driver.
 - (2) Number 6 is the section truck driver.
- g. Radio telephone operator (light truck driver).

7. General Duties of Personnel

a. *Platoon (Section) Commander.* The platoon (section) commander is responsible for the operation of the firing section. He performs the following duties:

- (1) Supervises the preparation and execution of fire missions.
- (2) Supervises the maintenance and operation of section equipment.
- (3) Supervises the training and directs the tactical employment of the section.

b. *Chief of Section.* The chief of section is the noncommissioned officer in command of the section. He is responsible to the platoon commander for—

- (1) Training and efficiency of section personnel.
- (2) Execution of fire commands by his section.

- (3) Performance of duties listed under section drill (ch. 3), testing and adjustment of sighting and fire control equipment, and inspection and maintenance of all section vehicles and equipment.
- (4) Determination and application of low-level wind corrections.
- (5) Compliance with safety regulations.
- (6) Preparation of field fortifications for protection of equipment, rockets, and personnel.
- (7) Local perimeter security.
- (8) Camouflage and radiological, biological, and chemical security discipline.
- (9) Police of section area.
- (10) Maintenance of launcher records.

c. *Gunner.* The gunner is the assistant to the chief of section in carrying out the duties specified in b above. He lays the launcher for deflection and performs duties listed in tables I through VI.

Tables I through VII appear in back of manual.

d. *Senior Assembly Specialist.* The senior assembly specialist is responsible for—

- (1) Assisting the chief of section and the gunner in carrying out duties specified in b and c above.
- (2) Supervising the handling, checkout, testing, and preparation of the rocket.
- (3) Performs additional duties as outlined in tables I through VII.

e. *Assembly Specialists.* The assembly specialists are responsible for—

- (1) Handling, checkout, testing, and preparation of the rocket motor for firing.
- (2) Preparation, checkout, and testing of the nuclear warhead.
- (3) Preparation and fuzing of all warheads.

- (4) Performing additional duties as prescribed in tables I through VII.

f. Launcher Crewmen.

- (1) The launcher crewmen perform the duties listed in tables I through VI and any additional duties assigned by the chief of section.
- (2) Crewmen number 2 drives and performs maintenance on the launcher. He also performs duties as listed in tables I through VII.
- (3) Crewman number 6 drives and performs maintenance on the section truck. He also performs additional duties as prescribed in tables I through VI.

- (4) Crewmen numbers 3, 4, 5, and 6 operate and perform maintenance on the AN/PMQ-6 low-level wind equipment, and perform additional duties as prescribed in tables I through VII.

- (5) Crewmen 5 and 6 operate and perform maintenance on the AN/MMQ-1-series low-level wind equipment and perform additional duties as prescribed in tables I through VI.

g. Radio-telephone Operator. The radio-telephone operator drives the section commander's vehicle, and performs other duties as directed by the platoon (section) commander or the chief of section.

CHAPTER 3

SECTION DRILL

Section I. GENERAL

8. Objective

The drills prescribed in this manual will assist unit commanders in developing efficient, precise, and rapid operations within the firing sections.

9. Instructions

a. Section drill is conducted in silence except for commands and reports. The section is drilled until reactions to commands are automatic, immediate, and efficient.

b. Battery officers supervise the drill to insure that instructions are carried out and that maximum efficiency is obtained.

c. Mistakes are corrected immediately. *Each* member of the section *must* report promptly to the chief of section any mistakes discovered either before or after the command to fire has been given. The chief of section reports mistakes immediately to the platoon commander.

d. Duties should be rotated during training so that each member of the section can perform all duties within the section. In addition, battery overhead personnel not assigned specific duties during drill periods should be trained in the fundamentals of section drill so that they will be capable of functioning effectively with a firing section when required.

Section II. PRELIMINARY COMMANDS AND FORMATIONS

10. Forming the Section

To form the section, the chief of section takes his post and gives one of the following commands:

a. To form the section, the command is FALL IN. The section—

- (1) Moves at double time.
- (2) Forms in single rank at close interval, with the gunner on the right and the senior assembly specialist, the launcher crewmen in numerical order, the assembly specialists, and the radio-telephone operator to the left of the gunner.
- (3) Centers on the chief of section at a distance of 3 paces (fig. 1).

b. To form the section in a particular place, the commands may be—1. IN FRONT (REAR) OF YOUR LAUNCHER. 2. FALL

IN. The section—

- (1) Moves and forms a single rank as in *a* above.
- (2) Guides on the gunner.

c. To form the section in a particular direction, the commands may be—1. ON THE ROAD FACING THE PARK. 2. FALL IN. The section will—

- (1) Move and form a single rank as in *a* above.
- (2) Face the direction indicated in the command.

Note. At the first formation for a drill or an exercise, the caution "As a section" precedes the command.

11. To Call Off

With the section in formation, the command is CALL OFF.

a. All personnel in ranks except the gunner executes eyes right.

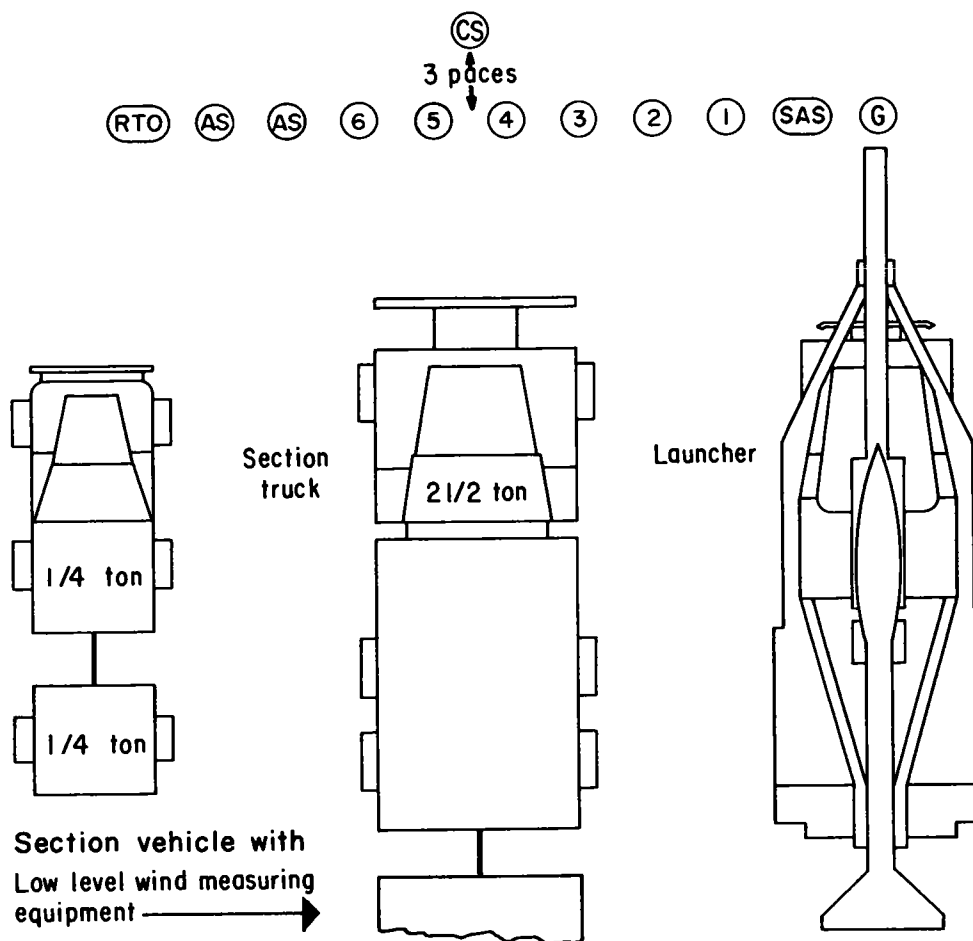


Figure 1. Firing section in formation.

b. The section calls off in sequence: "Gunner, senior assembly specialist, 1, 2, 3, 4, 5, 6, assembly specialist 1, assembly specialist 2, radio-telephone operator."

c. As each man calls out his designation, he turns his head smartly to the front.

12. To Take Posts

The command is 1. CREWMEN. 2. POSTS.

a. The command is general and may be given in or out of ranks, at a halt, or while marching.

b. All movements are executed at double time and are terminated at the position of attention.

c. The section moves to posts as shown in—

- (1) Figure 2, dismounted.
- (2) Figure 3, mounted.
- (3) Figure 4, prepared for action.

13. To Change Posts

The post of section personnel should be changed frequently to train all members of the section in all duties. The command is—1. SECTION CHANGE POST. 2. MARCH.

a. The leftmost man moves at double time to the post of gunner.

b. All the other men take two left steps, occupying the previously held position of the man on his left.

14. To Mount

To mount, the following commands may be given:

- a. 1. PREPARE TO MOUNT. 2. MOUNT.
 - (1) At the preparatory command, the section moves at double time to the positions shown in figure 2.

- (2) At the command of execution, personnel mount and take positions as shown in figure 3.
- (3) Vehicle commanders and drivers verify that all equipment is secure, and that safety straps and tailgate are secure after mounting.
- (4) If any member of the section is not to mount, he is designated and cautioned to stand fast; for example, 1. PREPARE TO MOUNT, DRIVER STAND FAST. 2. MOUNT.

b. MOUNT. The section moves directly to the positions shown in figure 3.

15. To Dismount

To dismount, the following commands may be given: 1. PREPARE TO DISMOUNT. 2. DISMOUNT.

a. At the preparatory command, personnel assume positions from which they can dismount rapidly.

b. DISMOUNT. The section moves without delay to positions as shown in figure 2.

16. To Fall Out

The command FALL OUT is given to provide rest and relief during drill or firing.

a. During drill—

- (1) The command may be given at any time.
- (2) The section remains in the vicinity of the drill area.

b. When firing—

- (1) The command may be given when firing is temporarily suspended.
- (2) The section remains in the vicinity of, but clear of, the launcher.
- (3) The settings and layings on the launcher are not disturbed.

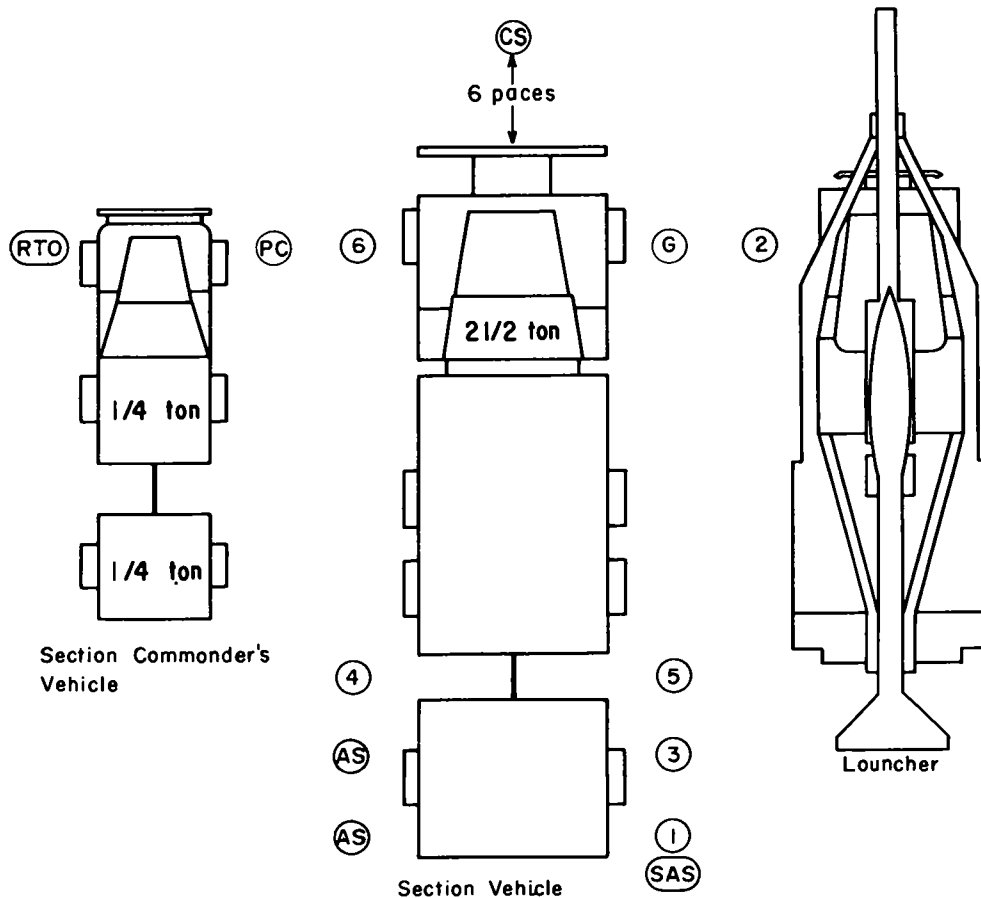
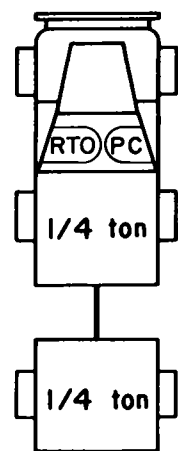
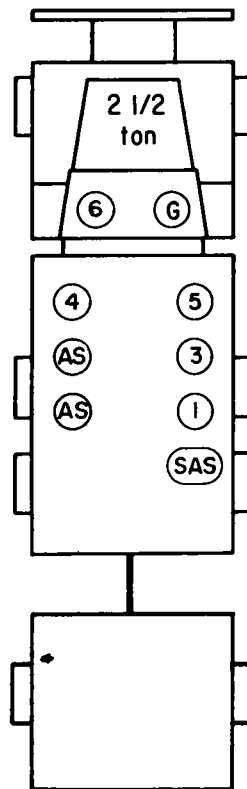


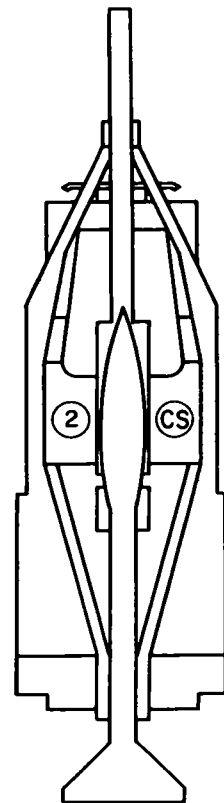
Figure 2. Posts, dismounted.



Section Commander's Vehicle



Section Vehicle



Launcher

Figure 3. Posts of the firing section, mounted.

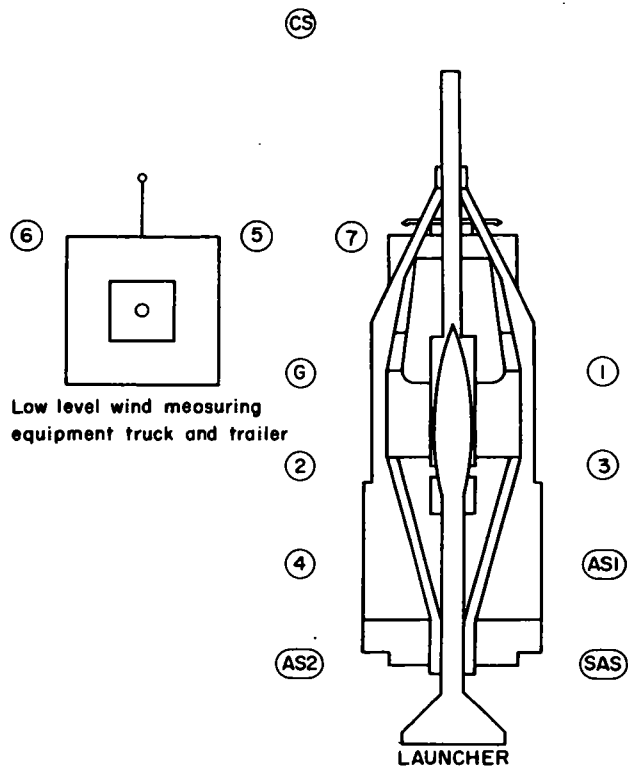


Figure 4. Posts prepared for action.

CHAPTER 4

PROCEDURES AND DUTIES FOR LOADING, PREPARATION FOR ACTION, FIRING, AND MARCH ORDER

Section I. LOADING THE LAUNCHER

17. Loading Operations

Loading operations may be performed at the firing position; normally, however, loading operations are accomplished at points located some distance from the firing position. These operations consist of—

- a. Installing the fins if necessary (MGR-1A only).
- b. Transferring the rocket from the rocket trailer to the launcher.
- c. Connecting the heating blankets to the electrical receptacles on the launcher if the ambient temperature requires heating the rocket motor.

18. Responsibilities for Loading

Loading operations are the responsibility of the firing section. However, personnel and equipment are required from the assembly and transport section to assist the firing section in transferring the rocket from the trailer to the launcher. The chief of section normally directs the loading operation. The firing platoon (section) commander is responsible for selection of the loading point(s) for the platoon and for reporting the location(s) to the battery commander. Loading operations may be performed prior to moving the launcher to the firing position or as a part of the preparation for action in those instances when loading is impractical prior to occupation of position.

19. Loading Procedure

The following procedures are used in loading the rocket on the launcher. (For duties of each

member of the section see table I. Loading operations are also discussed in TM 9-1055-202-10.)

- a. Install rocket fins, if necessary, while the rocket is still on the rocket trailer.
- b. Secure handling beam to the rocket.
- c. Position vehicles to best fit the terrain of the loading point. There is no set procedure for positioning the trailer, launcher, and wrecker. However, it is desirable to select positions which minimize the distance that the wrecker boom must be extended to accomplish the loading operation; the weight of the assembled rocket is an overload for a fully extended wrecker boom. (An example of vehicle positions is shown in fig. 5.)

Note. The maximum permissible boom extension for the M62 or M543 wrecker is determined by the radius from pivot post to hoist hook. This radius is 13 feet 6 inches for the MGR-1A rocket and 15 feet 6 inches for the MGR-1B rocket.

- d. Lower the outriggers of the wrecker to the ground.
- e. Disconnect heating blankets if necessary.
- f. Attach the lifting hook of the wrecker boom to the lifting eye of the handling beam. The lifting eye on the handling beam should be positioned so that the suspended rocket hangs at an angle approximately equal to the angle of the launcher beam in traveling position.

- g. Attach four guide ropes to the handling beam so that the rocket can be controlled during transfer.

h. Lift the rocket from the trailer and swing it to the launcher rail. Commands to the wrecker operator (hand signals) are given only by the chief of section.

i. Position and lower the rocket so that the front and rear shoes rest in the appropriate slots on the rail.

j. Slide the rocket forward past the spring loaded pawls with the wrecker boom; then

slide the rocket back until the rear shoes engage the pawls.

k. Remove the handling beam from the rocket and swing it back to the rocket trailer with the wrecker boom.

l. Connect the heating blankets to electrical outlets on the launcher rail if required.

m. Secure the rocket to the launcher beam with the rocket traveling clamps if the launcher must be moved to the firing position.

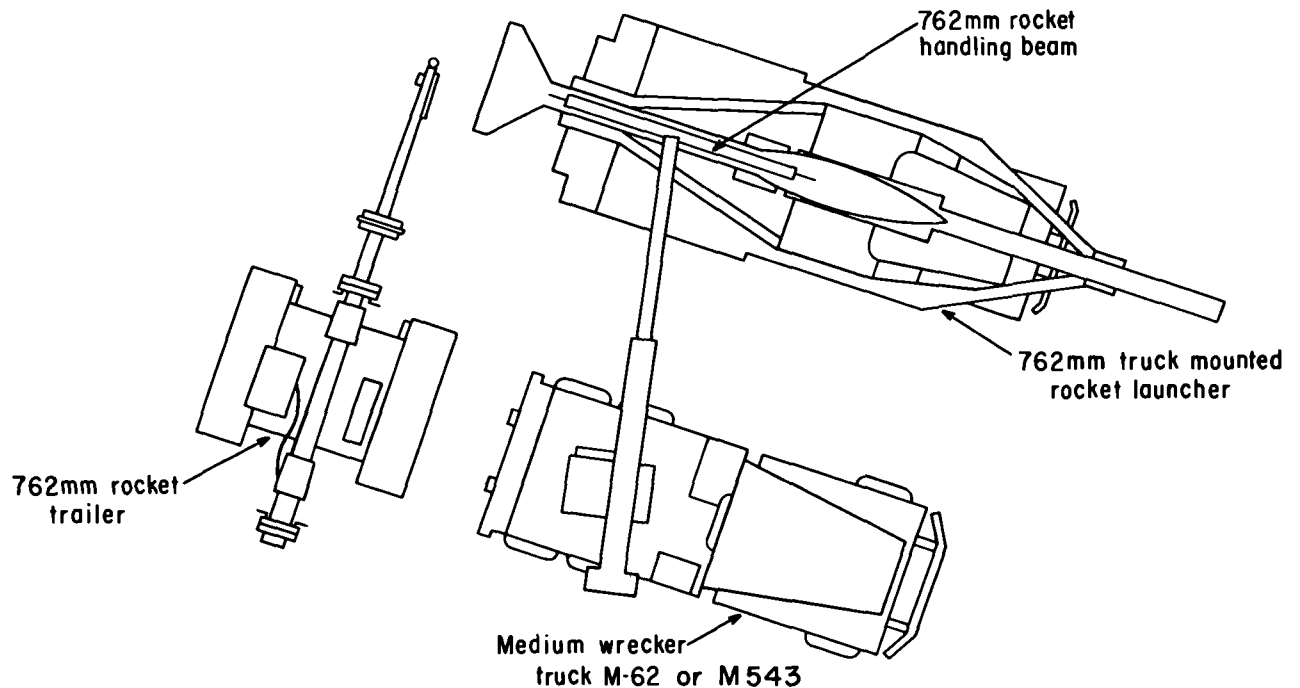


Figure 5. Position of vehicles for loading.

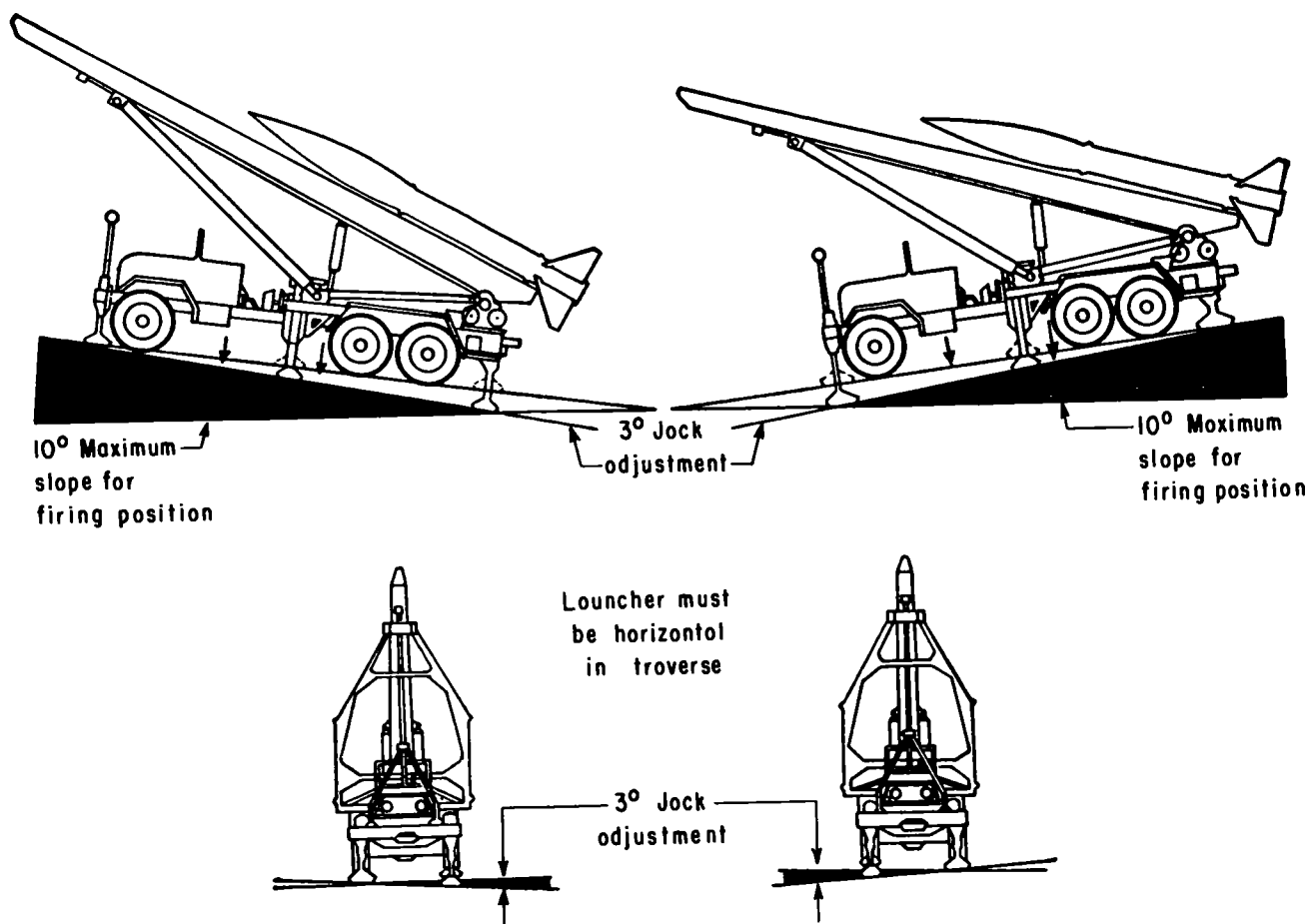


Figure 6. Maximum emplacement angles, launcher M289.

Section II. PREPARATION FOR ACTION

20. General

a. The launchers of a battery normally will be put into position individually under the direction of the platoon commanders and chiefs of section. The sight mount on the launcher should be positioned over the surveyed point in the firing position. As an aid to the launcher driver and section chief in orienting the launcher in the general direction of fire a centerline should be established on the ground. This can be accomplished by placing engineer tape on the ground in the direction of fire. Each launcher is directed into position by the chief of section. Hand signals for guiding vehicles are given in FM 21-60. Maximum allowable emplacement angles (fig. 6) are 10° on forward and rear slopes and 0° of cant. The maximum adjustment

of the launcher jacks is 3°. The firing position can therefore be sloped 10° forward or to the rear and 3° laterally. The launcher must be cross-leveled when loading or firing. Full traverse of the launcher rail right and left of center cannot be accomplished unless the angle formed by the truck chassis and the launcher beam is equal to or greater than 213 mils. (Launcher-beam separation angle). If firing on minimum range targets is anticipated (6,200 meters approximately) consideration must be given to locating the launcher on forward sloping terrain. Otherwise the traversing capability of the launcher will be limited.

b. The general duties and instructions given in paragraphs 7 and 9 apply to section drill for preparation for action. A detailed description

of certain duties performed during preparation for action is contained in paragraphs 24 through 26.

21. Prepare for Action

a. After the launcher has been directed into position by the chief of section, preparation for action is initiated without command. The duties of individual crew members are given in table II when the unit has the AN/MMQ-1 wind measuring equipment, and table III when the

unit has the AN/PMQ-6 wind measuring equipment. Each man takes his post (fig. 4) upon completion of his duties.

b. If preparation is not desired, the command, DO NOT PREPARE FOR ACTION, must be given.

c. The low-level wind measuring set is prepared for action in accordance with TM 11-6660-203-10. For duties of personnel, see tables II and III.

Section III. DUTIES IN FIRING AND MARCH ORDER

22. Duties in Firing

The duties of individual crew members in firing are shown in table IV.

23. Duties in March Order

The duties of individual crew members in preparing for travel are shown in table V or VI depending on the type wind measuring equipment issued to the section.

Section IV. DETAILED DESCRIPTION OF CERTAIN DUTIES

24. Duties of the Chief of Section

Details of certain duties of the chief of section are as follows:

a. *Measures the Site To Mask.* The command is MEASURE THE SITE TO MASK. The chief of section directs the gunner, and number 2, to traverse and elevate the launcher rail until his line of sight, along the rail, just clears the highest crest within traverse limits. He then directs number 2 to measure the elevation. This angle is reported to the platoon commander as the site to mask. If it is necessary to move the launcher to fire on a target outside of traverse limits, the site to mask must be again verified. The new site to mask will be immediately reported to the platoon commander if it is greater than the initial value. If the section is allowed time to prepare the position prior to occupation for firing, the site to mask should be determined with an aiming circle as part of the preparation.

b. *Identifies the Aiming Point to the Gunner.* Whenever an aiming point (other than the aiming circle) has been designated by the platoon commander, the chief of section will insure that he has properly identified the point designated. He will then identify it to the gunner. If there

is any possibility of misunderstanding, the chief of section will identify the point by turning the panoramic telescope until the horizontal and vertical hairlines are on the point designated. A distant aiming point should be used only as a secondary means for referring the launcher.

c. *Reports Mistakes and Other Unusual Incidents to the Platoon Commander.* If for any reason it appears that the rocket cannot be fired, the chief of section will promptly report this fact and the reasons therefor to the platoon commander. If it is discovered that a rocket has been fired with a mistake in laying, the chief of section will immediately report the nature and magnitude of the error to the platoon commander; for example, "Sir, error in deflection, 54 mils. Deflection 2828 was fired instead of 2882." He also reports other unusual incidents that affect the service of the launcher.

d. *Records Basic Data.* The chief of section will record data of a semipermanent nature in a notebook. These data will include—

- (1) Site to mask.
- (2) Aiming point(s) used, with reference deflection(s).
- (3) Safety limits in deflection and elevation.

- (4) Rockets fired.
 - (a) Number.
 - (b) Date and time of firing.
 - (c) Rocket motor type, lot number, serial number, and stenciled weights.
 - (d) Warhead type and stenciled weight.

e. Assigns Duties When Firing is Conducted With a Reduced Number of Personnel. Whenever the number of section personnel are reduced below that indicated in this manual, the chief of section will combine the duties to best facilitate the service of the launcher. Loss of cadremen, casualties, and various details will necessitate operation with less than authorized personnel. This situation can therefore be anticipated as the rule rather than the exception. When 24 hour firing is required, the section must be divided and work in shifts to provide some measure of relief for crew members.

f. Verifies Adjustment of Sighting and Fire Control Equipment. Tests and adjustments of sighting and fire control equipment specified in TM 9-1055-202-10 and chapter 6 of this manual must be performed regularly. The chief of section is responsible for the conduct of the prescribed tests and adjustments. He reports all unusual results to the platoon commander.

g. Controls Movement of the Launcher. The launcher should be laid on an initial azimuth which is as close to the center of sector and center of traverse as possible. If it becomes necessary to move the launcher, the chief of section instructs the driver and controls the displacement by either voice or hand signals.

h. Supervises Preparation of the Rocket and Warhead. The chief of section is responsible that all prescribed rocket and warhead tests are completely and accurately performed.

25. Duties of the Gunner

Details of certain duties of the gunner are as follows:

a. Centers the Cross-Level and Longitudinal-Level Bubbles on Panoramic Telescope Mount. The gunner initially centers the cross-level and longitudinal-level bubbles on the telescope mount as part of all operations involving use of the panoramic telescope. The bubbles are always centered and leveling is verified prior to

using the sight and before firing. See TM 9-1055-202-10 for a description of the telescope and mount.

b. Zeros the Sight. The gunner—

- (1) Aligns the movable azimuth micrometer index (gunner's aid) of the sight with the right (fixed) index.
- (2) Loosens the slipping micrometer scale locking nut by turning it counterclockwise while firmly holding the azimuth micrometer knob with his right hand.
- (3) Slips the slipping micrometer scale until its zero is in coincidence with the left index, tightens the locking nut, and verifies the alinement of the zero on the scale with the left index.
- (4) Turns the azimuth micrometer knob so that the left index and the zero of the slipping micrometer scale are aligned with the zero of the gunner's aid on the right index.
- (5) Opens the door; with the azimuth micrometer knob or rotating head, sets the nonslipping azimuth scale at zero; and closes the door.
- (6) Loosens the slipping azimuth scale locking screw; moves the slipping azimuth scale until its zero coincides with the index on the outside of the door.
- (7) Tightens the locking screw and verifies the reading. With the sight thus zeroed, the gunner will set and read deflections (hundreds of mils) on the slipping azimuth scale at the index on the door; he will also set and read the last two digits of the deflection (tens and units) on the azimuth micrometer scale.

c. Lays the Launcher for Direction. The platoon commander commands AIMING POINT THIS INSTRUMENT, NO. (so-and-so), DEFLECTION (so much). After the sight has been zeroed (*b* above), the gunner sets the announced deflection on the panoramic telescope by disengaging the throwout lever and turning the rotating head to the announced 100 mil graduation. He releases the throwout lever and, using the azimuth micrometer knob, turns off the last two digits of the deflection on the azimuth micrometer scale. He then traverses the launcher until his line of sight through the tele-

scope is on the center of the objective lens of the aiming circle. He checks to insure that the bubbles are level and announces, "Sir, No. (so-and-so) ready for recheck." As additional deflections are announced by the platoon commander, he sets them on the sight and traverses the launcher so that the vertical hair of the sight is on the aiming circle. When the platoon commander announces, "No. (so-and-so) is laid," the launcher is oriented and should not be traversed except on order of the platoon commander.

d. Sets a Deflection on an Aiming Point After the Launcher Has Been Laid.

- (1) After the launcher has been laid (c above), the platoon commander commands DEFLECTION 2800. At this command, the gunner loosens the locking screw of the slipping azimuth scale and moves the scale until 2800 is in coincidence with the index on the door. The gunner then unlocks the slipping azimuth micrometer scale locking nut and moves the slipping azimuth micrometer scale to zero; he then tightens the locking nut and verifies that the zero mark is in coincidence with the index and that the reticle is still on the aiming circle.
- (2) After the launcher has been laid (c above) and the platoon commander selects an aiming point other than the aiming circle, he may command AIMING POINT, LONE TREE, REFER. At this command, the gunner refers the sight to the LONE TREE and reports the deflection to the platoon commander. The platoon commander commands DEFLECTION 2800. The gunner then aligns the scales of the sight on the designated point as outlined in (1) above.

e. Sets or Changes the Deflection. The command to announce deflection is DEFLECTION (so much). If, for example, the command is DEFLECTION 2683, the gunner disengages the throwout lever with his left thumb and turns the rotating head of the sight to 26 (2600). He releases the throwout lever and, with his right hand, turns off the remaining 83 mils on the micrometer scale. He then traverses the

launcher until the vertical hair is on the aiming point, being careful that the last motion will cause the vertical hair of the telescope to approach the aiming post from the left to take up any lost motion in the mechanism.

f. Refers the Launcher. The command from the platoon commander to refer the launcher is AIMING POINT THIS INSTRUMENT (OR OTHER POINT), REFER. With the bubbles level and without disturbing the lay of the launcher, the gunner turns the sight until the vertical hair is on the point designated. He then reports the deflection to the platoon commander, "Sir, No. (so-and-so), deflection (so much)."

g. Reports Launcher Laid and Ready To Fire. When the final firing data have been applied to the launcher, the gunner verifies the laying, removes the telescope from the mount, and reports to chief of section, "Launcher laid and ready to fire."

26. Duties of No. 1 Launcher Crewman

a. Lays the launcher for initial and final quadrant elevation.

- (1) An elevation, quadrant 361.8 for example, is set on the gunner's quadrant as follows: The upper edge of the index plate is set opposite the 360 mark of the graduated arc on the quadrant frame, and the micrometer knob on the index arm is turned to read 1.8. Care must be taken to use the same side of the quadrant in setting both the index plate and the micrometer knob.
- (2) No. 1 then cross-levels the quadrant mount and places the elevation lock handle in the unlocked position.
- (3) With the announced quadrant elevation set on the gunner's quadrant, the quadrant is placed on the quadrant seat of the quadrant mount. The words *line of fire* must be at the bottom of the quadrant, and the line-of-fire arrow must be pointing in the direction of fire. No. 1 must be sure to use the arrow which appears on the same side of the quadrant as the scale which he is using. He stands squarely opposite the side of the quadrant and holds it firmly on the quadrant seats parallel

to the longitudinal axis of the launcher rail. It is important that he take the same position and hold the quadrant in the same manner for each subsequent setting, so that in each case he will view the quadrant bubble from the same angle.

- (4) He then directs the launcher driver to power elevate or depress the launcher beam until the bubble is approximately centered. He then places the elevation lock handle in the locked position and manually elevates or depresses the launcher beam to center the bubble, being careful that the last motion is in the direction in which it is more difficult to turn the handwheel.

b. Measures the Quadrant. At the command MEASURE THE QUADRANT, No. 1 places the gunner's quadrant on the quadrant seats of the quadrant mount and performs the following operations:

- (1) Moves the index arm of the gunner's quadrant until the bubble passes to the end of the vial away from the index arm hinge.
- (2) Lowers the index arm slowly until the bubble just passes to the end of the vial toward the hinge.
- (3) Turns the micrometer until the bubble is exactly centered.
- (4) Removes the gunner's quadrant and reports the quadrant to the nearest one-tenth mil.

CHAPTER 5

TECHNIQUES AND SITUATIONS THAT REQUIRE SPECIAL ATTENTION

27. General

It is not feasible to fire a round-by-round cannon artillery type adjustment with the 762-mm rocket. Therefore, precise and accurate procedures assume added significance.

28. Precision in Laying

a. Sighting and laying instruments and elevating and traversing mechanisms must be properly operated to reduce the effects of lost motion. For uniformity and accuracy, the last motion in setting instruments and in laying for deflection should always be in the same direction; from left to right. When laying for elevation the last motion is in the direction in which it is more difficult to turn the handwheel. To insure accurate laying, personnel who lay the launcher must be required to verify the laying just prior to firing.

b. When setting and reading a scale or centering a bubble, the line of sight should be at a right angle to the scale or level vial to prevent parallax errors. Bubbles should be centered exactly.

c. For uniformity and accuracy in laying on the aiming circle, the vertical hair in the reticle of the panoramic telescope should be centered on the objective lens of the aiming circle.

d. When setting deflections, the last motion of the sight must be in the direction of increasing deflection.

29. Aiming Points

a. *General.* After the launcher has been laid initially for direction, it may be referred to one or more distant aiming points as described in b below. An aiming point must have a sharply

defined point or vertical line which is clearly visible from the launcher so that the vertical hair of the panoramic telescope can be aligned on exactly the same place each time the launcher is relaid.

b. *Distant Aiming Point.* A distant aiming point is one at sufficient distance (2,000 to 3,500 meters) so that normal displacements of the launcher in traverse will cause a horizontal angular change in direction (with the same settings on the azimuth scales) of not more than one-half mil. The platoon commander designates the distant aiming point(s) to be used.

30. Cease Firing

The command CEASE FIRING normally is given to the firing section by the chief of section, but in emergencies anyone present may give the command. At this command, regardless of its source, firing will cease immediately. If CEASE FIRING comes from the fire direction center (FDC) firing is resumed at the announcement by the FDC of the quadrant elevation. If CEASE FIRING comes from within the section or platoon, the platoon commander will investigate the condition which caused the command to be given. When the condition has been corrected preparation for firing is resumed by the platoon commander's announcement of the quadrant elevation.

31. Changes in Data During Preparation for Firing

If it is necessary to correct any element of firing data previously ordered but not yet executed, the command CEASE FIRING is given followed by the corrected data. Firing will be resumed at the announcement of the quadrant elevation.

32. To Unload the Rocket

Once a rocket has been prepared for firing, every effort should be made to fire it. When circumstances prevent firing, the rocket will be disarmed in accordance with the procedures specified in TM 9-1340-202-12 and, if required, unloaded from the launcher in accordance with the procedures outlined in TM 9-1055-202-10.

Caution: The assembly specialists must accomplish all procedures until the rocket motor is disarmed and the fuzing system has been safed. All other personnel must remain clear of the launcher during these operations. The launcher must not be moved, except to depress the launcher beam, until disarming is complete.

33. Care and Storage of Ammunition

a. No provisions have been made for long-term storage of rockets in the battery or battalion. Rocket trailers are provided for limited storage of rockets in the rocket assembly position. Rockets are stored on these trailers with their noses pointed in the same direction until they are needed at the firing position. If a surplus of rockets exists and it is considered unwise to complete additional assemblies, the component parts may be separated into storage areas for each component.

b. The shipping plug and plastic nozzle closure must be in place in the MGR-1A rocket series.

c. The rocket components should be stored in accordance with the quantity-distance tables (TM 9-1340-202-12).

d. Storage at extreme temperatures should be avoided.

e. Specific temperature limits are as follows:

	MGR-1A rocket	MGR-1B rocket
Firing -----	0° to 120° F.	-30° to 100° F.
Handling -----	0° to 120° F.	-40° to 120° F.
Storage -----	-10° to 120° F.	-65° to 130° F.

f. The launcher beam with the MGR-1A rocket in place must be elevated to an 800-mil quadrant elevation prior to arming the warhead section to insure that the motor propellant grain is seated against the internal stops.

Caution: When an M66 motor assembly is placed in a container, the motor assembly must be guided so that the restraint socket on the

nozzle is alined with the transportation restraint in the container. Misalignment of the motor with the transportation restraint may rupture the skin surface of the rocket motor.

34. Temperature Conditioning of Rockets

A temperature conditioned rocket is one in which the propellant temperature is uniform throughout the grain. A uniform temperature is essential to insure even burning of the propellant. If the rocket motor is improperly conditioned, the temperature gradient (differences in temperature throughout the propellant grain) will cause uneven burning and contribute to the thrust malalignment error. Further, variations in temperature gradients make it impossible to obtain valid propellant temperature measurements for use in computing temperature corrections. Heating blankets are provided for temperature conditioning purposes; proper use of these blankets is essential. The following procedures will produce the best results:

a. The rocket should not (unless absolutely necessary) be exposed to the direct rays of the sun or to a cold chilling wind. Exposure to such environments for even a short period of time will result in an improperly conditioned rocket.

b. Blankets should be installed when the rocket components are drawn from the special ammunition supply point (SASP).

c. Blankets should not be removed from the rocket earlier than 15 minutes prior to firing.

d. Blankets should be used primarily as insulation (no heat applied) unless the ambient temperature goes below minimum permissible limits (para. 33e).

e. If it is anticipated that ambient temperatures will go below minimum permissible limits, heat should be applied. The motor should be heated continuously for a minimum of 24 hours prior to firing. Heating for 48 hours is recommended.

Note. ALWAYS INSULATE, HEAT ONLY WHEN REQUIRED.

35. Installation and Removal of the Heating Blankets

Installation and removal of the heating blankets are accomplished by the crewmen,

supervised by the chief of section. The procedure for the installation and removal of the heating blankets is contained in TM 9-1055-202-10.

36. Installation and Removal of the Launcher Beam

Since the launcher beam may be higher than some underpasses, it may be necessary to remove the launcher beam to avoid excessive delays caused by using alternate routes. For detailed instructions in installing and removing the launcher beam, see TM 9-1055-202-10.

37. Dropping the Rocket Motor

a. Extreme care must be exercised to avoid dropping the rocket motor. Dropping a rocket motor, either crated or uncrated, may result in cracks in the propellant. Such cracks may cause malfunctions; therefore, if a motor is dropped

and doubt exists as to the condition of the propellant, the motor should be suspended from use and reported to the supporting ordnance unit.

b. A drop of 2 feet or more for the MGR-1A series or a drop of any distance for the MGR-1B rocket motor is cause for immediate suspension.

c. Requests for disposition instructions should include the distance the rocket motor was dropped, the type surface upon which it was dropped, the ambient temperature, and a description of the damage to the metal parts.

38. Camouflage

Standard camouflage procedures as prescribed in the FM 5-20 series apply to all standard equipment authorized the 762-mm rocket firing battery.

CHAPTER 6

BORESIGHTING AND BASIC PERIODIC TESTS

Section I. GENERAL

39. Purpose and Scope

This chapter outlines the procedures for boresighting and for making basic periodic tests on on-carriage fire control equipment. The procedures covered will include only those that may be accomplished at battery level.

40. Equipment

The following equipment is needed for performing boresighting and periodic tests:

a. Boresighting Bracket Assembly. The section equipment includes a boresighting bracket assembly.

b. Tools. The section equipment includes all necessary tools for boresighting and testing. Care must be taken to insure that damage to

equipment does not result from carelessness or the use of inappropriate tools; such as, the wrong wrench or screwdriver.

c. Plumb Line. The plumb line is essential in the basic periodic test to obtain maximum accuracy. The farther from the launcher that the plumb line is placed, the longer the line must be. Weights, such as wrenches or rocks, may be used to keep the line taut. The tendency of the weight to swing may be decreased by placing a bucket containing water or other liquid under the plumb line so that the weight is suspended in the liquid. A plumb line strung from a building or tree is most desirable and should be used if possible. Units in garrison may find it convenient to rig a permanent plumb line on a building.

Section II. BORESIGHTING

41. General

a. Definition. Boresighting is the process of aligning the line of sight of the panoramic telescope to the longitudinal axis of the launcher rail. The launcher is boresighted before firing, and a boresight check should be made each time the launcher occupies a firing position.

b. Leveling. The launcher will be leveled for boresighting. The level of the launcher may be checked by using the quadrant seats on the rear of the launcher beam, the two level and housing assemblies located on the traverse platform, and the level and housing assembly located on the left hand fender plate of the launcher. The accuracy of the level vials may be checked when time permits by leveling the launcher using the

leveling vials, suspending a plumb line directly in front of the launcher beam, and elevating the beam to maximum elevation. The beam should track the plumb line throughout the range of elevation. If it does not, the vials are out of adjustment and must be repaired by ordnance personnel.

42. Boresighting With the Boresight Bracket Assembly

Boresighting with the boresight bracket assembly consists of bringing the line of sight and indexes of on-carriage fire control equipment into proper alignment with the launcher rail by using the scribed line on the boresighting bracket as an aiming point. The steps to be followed are listed below:

a. Install the boresighting bracket at the rear shoe lift off point on the forward end of the launcher rail and tighten the set screws. The aiming post light M14 is required for night use only.

b. Perform an end-for-end test on gunner's quadrant.

c. Level and cross-level the launcher as outlined in paragraph 41b.

d. Place the gunner's quadrant, set at 210 mils, on the quadrant seats mounted at the right rear of the launcher beam and elevate the beam until the bubble in the quadrant is level. Place the gunner's quadrant on the quadrant seats at the rear of the launcher beam to determine if the beam is cross-leveled.

e. Cross-level the quadrant mount M1 and place the gunner's quadrant on the quadrant seats of the quadrant mount. The elevation on the gunner's quadrant should measure 210 mils within plus or minus one-quarter mil. If it does not, the quadrant mount must be referred to the authorized ordnance maintenance personnel for correction. However, if immediate repair is not possible, the quadrant mount may be used provided that the necessary correction for error is applied to all future elevation settings made with the quadrant mount.

f. Level and cross-level the telescope mount. Place the gunner's quadrant on the quadrant

seats of the telescope mount. The elevation on the gunner's quadrant should measure 210 mils plus or minus 2 mils. If the quadrant does not read within the tolerances specified, the quadrant seats on the sight mount must be adjusted. The adjustment is performed as follows:

- (1) Loosen the four cap screws which secure the actuating arm to the trunnion.
- (2) Set the gunner's quadrant to 210 mils and place it on the sight mount quadrant seats.
- (3) Turn the concentric screw (located between the top two cap screws) in the appropriate direction until the bubble in the quadrant is level.
- (4) Tighten the 4 cap screws.

43. Panoramic Telescope Lateral Alinement

Zero the sight (para. 25b) and aline the vertical hairline of the panoramic telescope with the vertical scribed lines on the boresighting bracket in the following manner:

a. Loosen the tangent locking screws.

b. Adjust the tangent screws until the vertical hairline is properly alined, making sure that the panoramic telescope fits snugly against the tangent screws without binding.

c. Tighten the locking screws and verify their adjustment.

Section III. BASIC PERIODIC TESTS

44. General

Basic periodic tests are performed by the section under the supervision of the platoon commander. These tests are performed at the discretion of the unit commander. Suggested frequency of the tests is once each month if the launcher is used only for nonfiring training; once every week if the launcher is used for firing; and as soon as possible after extensive use, accidents, or traversing extremely rough terrain. These tests reveal whether or not the on-carriage sighting equipment and the gunner's quadrant are in correct adjustment. Preparation for the tests include—

a. Accurately leveling and cross-leveling the launcher by using the gunner's quadrant, levels, and leveling jacks. The leveling should be checked carefully since the tests prescribed in paragraphs 45 through 52 are dependent on the trunnions being accurately leveled at all times.

b. Boresighting the launcher (para. 42).

45. Test of the Gunner's Quadrant

The gunner's quadrant must be in proper adjustment before conducting tests and adjustments of other sighting and fire control equipment. Inspect the shoes of the gunner's quadrant for dirt, nicks, or burs, and polish the

shoes. Similarly, inspect and polish the quadrant seats on the launcher beam and the quadrant mount.

46. End-for-End Test, Gunner's Quadrant

a. Set both the index arm and micrometer scale of the gunner's quadrant at zero, making sure that the auxiliary indexes match.

b. Place the quadrant on the quadrant seats at the rear of the launcher beam and center the quadrant bubble using the leveling jacks.

c. Reverse the quadrant on the seats (turn it end-for-end). If the bubble recenters, the quadrant is in adjustment and the test is complete.

d. If the bubble does not recenter, try to center it by turning the micrometer knob. If the bubble centers, read the black figures and divide by 2. The quotient is the correction. Place the correction on the micrometer and level the launcher beam using the leveling jacks. Check by again reversing the quadrant. The bubble should center.

e. If the bubble does not center (*d* above), move the index arm down 1 graduation (10 mils). Turn the micrometer until the bubble centers. Add 10 to the reading on the micrometer and divide the sum by 2. The quotient is the correction. Place this correction on the micrometer, leaving the arm at minus 10; center the quadrant bubble by using the leveling jacks. Check by reversing the quadrant on the quadrant seat; the bubble should center.

f. The quadrant should be sent to an ordnance unit for repair if the correction of error amounts to more than plus or minus 0.4 mil.

47. Micrometer Test, Gunner's Quadrant

a. Set the index arm to read 110 mils on the graduated arc and set the micrometer scale at 0.

b. Place the quadrant on the quadrant mount seats with the line-of-fire arrow pointing toward the front of the launcher and center the bubble by using the elevating handwheel.

c. Set the index arm at 100 on the graduated arc and turn the micrometer 1 revolution to read 10 mils.

d. Reseat the quadrant on the quadrant seat. The bubble should center.

Caution: Do not disturb the laying of the launcher beam.

e. If the bubble does not center, the micrometer is in error and must be adjusted by ordnance personnel.

48. Comparison Test, Gunner's Quadrant

Compare readings from one gunner's quadrant obtained at low, medium, and high elevations with readings measured by all other quadrants of the battery on a single launcher at the same elevations. Any quadrant differing from the average by more than 0.4 mil at any elevation should be sent to ordnance for adjustment.

49. Correction, Gunner's Quadrant

When a gunner's quadrant requires a correction as determined by the end-for-end test, this correction is carried during firing and is applied by the chief of section to the command received from the FDC and to all quadrant elevations set on the launcher.

50. Test of Panoramic Telescope and Mount

a. The purpose of this test is to—

- (1) Determine whether the azimuth compensating mechanism of the telescope mount actually transmits the motion of the launching beam to the sight mount so that any deviation in deflection due to elevating the launcher beam is corrected throughout all elevations.
- (2) Check the adjustment and mounting of the telescope mount, the setting of the cross-level and longitudinal vials, and the alinement of the telescope socket.
- (3) Reflect total errors of the entire mechanism.

b. Because compensating errors of the various parts of the mount may result in the weapon testing out properly, the tests specified in paragraphs 51 and 52 should always be performed regardless of the results of this test. This provides for dividing the total errors found into errors in specific parts.

- c. The general test is performed as follows:
- (1) Level the launcher and check with a previously tested gunner's quadrant.
 - (2) Boresight the weapon.
 - (3) Level telescope mount bubbles and refer to a clearly defined distant aiming point.
 - (4) Elevate the launcher beam to maximum elevation, in 100-mil steps. At each step, level the mount bubbles and note the deviation of the optical axis of sight from the aiming point.
 - (5) Deflection deviation is measured on the azimuth micrometer scale; allowable deviation is one-half mil.

51. Basic Test for the Panoramic Telescope Mount and Panoramic Telescope

a. *Cross-Level Test.* Center the cross-level bubble and turn the longitudinal-level knob throughout its limit of motion. The cross-level bubble should remain centered within one-half vial graduation.

b. *Pivot Alinement Test.* Center the cross-level bubble and place the line of sight of the panoramic telescope on a sharply defined aiming point. (Plumb line may be used.) Elevate the launching beam to maximum elevation while keeping the telescope mount level longitudinally.

Note. Do not readjust the cross-level bubble after the initial setting. Check at low, medium, and high elevations of the launcher team. The line of sight of the panoramic telescope should not deviate more than one-half mil and the cross-level bubble should remain centered within one-half vial graduation.

c. *Vertical Alinement Test of Telescope Mount.* Set the launcher beam at 100 mils elevation and level the telescope mount bubbles. Operate the cross-leveling knob throughout its limit of motion. The longitudinal-level bubble should remain centered within one-half vial graduation.

d. *Telescope Mount Socket Alinement Test.* With the panoramic telescope scales set at zero, traverse the launcher until the vertical hair of the telescope reticle is on the plumb line (or aiming point) with both the cross-level and longitudinal-level bubbles centered. Sight through the telescope and rotate the elevation

micrometer knob throughout its limits of motion. The vertical hair should remain on the plumb line (aiming point) within one-half mil. Set the panoramic telescope scales at 1,600 mils, and sight on the plumb line (aiming point) with both the cross-level and longitudinal-level bubbles centered. Rotate the elevation micrometer knob throughout its limit of motion. The vertical hair should stay on the plumb line (aiming point) within one-half mil.

e. *Basic Test for the Panoramic Telescope.* Zero the scales on the panoramic telescope. Traverse the launcher beam as necessary to place the panoramic telescope reticle cross hairs on an aiming point. Rotate the telescope head through a complete circle (6,400 mils). The telescope cross hairs should return to the aiming point within 1 mil. Rotate the telescope head through a complete circle in the opposite direction. The telescope cross hairs should again return to the aiming point within one-half mil.

f. *Panoramic Telescope M12A7C Parallax Test.* Sight through the telescope at any convenient target at least 100 meters from the telescope. Move the eye about one-quarter inch from side to side and up and down at the normal eye distance from the eye piece while continuing to look through the telescope. If the cross hairs of the reticle appear to move with respect to the reference point on the target, the condition of parallax is present which renders the telescope inaccurate.

52. Basic Test of the Quadrant Mount M1

a. *Pivot Azimuth Alinement Test.* The pivot azimuth alinement test should be conducted simultaneously with the telescope mount pivot alinement test (para. 51b). Center the cross-level bubble and elevate the launcher beam from minimum to maximum elevation. The cross-level bubble should remain centered within one-half vial graduation.

b. *Pivot Vertical Alinement Test.* Set off an elevation of 100 mils on the launching beam by use of the gunner's quadrant on the quadrant mount. Operate the cross-level knob throughout its limit of motion. The quadrant bubble should remain centered within one-half vial graduation.

53. Procedure When Tests Exceed Tolerances

It is not contemplated that using units will have the necessary facilities, tools, or skilled mechanics to perform the more precise tests and adjustments of sighting and fire control equipment. If the quadrant mount, telescope mount, or panoramic telescope exceeds the tolerances prescribed on any of the tests outlined, the launcher and/or panoramic telescope should be sent to ordnance for adjustment or repair.

54. Establishing Serviceability of the Launcher Beam

a. *Definitions.* The curvature direction of the launcher beam in the vertical or lateral plane is determined by the direction the forward tip of the beam is deflected. The following terms regarding beam curvature will be used:

- (1) *Curved downward or upward.* In the vertical plane, when the rear tip is held stationary and the beam is bowed so that the top of the two ends are lower than the top center of the beam causing a "hump," the beam is curved downward. When the top of the two ends are higher than the top center of the beam causing a "sag," the beam is curved upward.
- (2) *Curved right or left.* In the lateral plane when the rear tip is held stationary and the beam is bowed so that the centerline of the front tip is displaced to the right of the centerline of the rear tip, the beam is curved right. When the centerline of the front tip is to the left, the beam is curved left.

b. *Serviceability Standards.* When a launcher beam is determined to be unserviceable, the launcher should be evacuated to Ordnance. A launching beam is unserviceable when curved—

- (1) Downward in excess of $2\frac{7}{32}$ inch.
- (2) Upward any amount.
- (3) Right or left in excess of $\frac{7}{16}$ inch.

c. *Determination of Serviceability.* Inspection by artillery personnel is only a means of determining serviceability of the launcher. Measurements must not be utilized to compute corrections for any malalignment noted. If the launcher is serviceable, no corrections for mal-

alignment are necessary. If unserviceable, the launcher should be turned in to local ordnance for disposition.

d. *Equipment.* Until a special gage is made available, procedures below are provided as a method for checking the launcher beam for serviceability. To perform the inspection locally, the following equipment is necessary.

- (1) Two machined steel blocks—one 3 inches high and one $3\frac{5}{8}$ inches high.
- (2) Piano wire, or wire which will stretch straight, of sufficient length to stretch the length of the launcher beam.
- (3) Scale with graduations of $\frac{1}{32}$ inch.
- (4) A carpenter's square or triangle.

e. *Preparation for the Inspection.*

- (1) Test should be conducted in a shaded area to eliminate heat distortion from the sun shining on the beam.
- (2) Elevate launcher beam to approximately 7° .
- (3) Make sure the equilibrators are not locked down and are in contact with the beam.
- (4) Center the 3-inch steel block on top of the beam at the extreme rear.
- (5) Center the $3\frac{5}{8}$ -inch steel block on top of the beam at the extreme front.
- (6) Stretch the piano wire over the blocks and center wire on the blocks at each end. The wire should be tightened to eliminate sag.

f. *Measurements in the Vertical Plane.*

- (1) Measurements along the length of the beam are made at 2-foot intervals between the top surface of rails and wire. The measurements obtained should be 3 inches except at the forward end of the beam where $3\frac{5}{8}$ inches should be measured forward of the step in the rail.
- (2) Five-eighths inch is subtracted from the reading taken forward of the step. Once this subtraction has been made, all measurements for a straight launcher beam will be 3 inches. Measurements in excess of 3 inches indicate that the beam is curved upward and is unserviceable. Measurements of

less than 3 inches indicate that the beam is curved downward. The launcher beam is unserviceable if measurements of less than $2\frac{3}{32}$ inches are obtained.

g. Measurements in the Lateral Plane. The piano wire centered on the ends of the beam represents the centerline of a straight launcher beam. Deviations between the piano wire and the centerline of the beam being inspected represent curvature right or left. Measurements are made by placing one side of a square along the rails or edge of the machined surface with a scale perpendicular to the edge of the rail. Only the following edges are to be used for taking measurements:

- (1) Outside edge of rear or widest rail should be $2\frac{7}{16}$ inches from the piano wire; the launcher beam is unservice-

able if measurements are more than $2\frac{1}{16}$ inches or less than 2 inches.

- (2) The inside edge of front or narrowest rails should be $\frac{7}{16}$ inch from the piano wire; the launcher beam is unserviceable if measurements are more than $1\frac{1}{16}$ inch or less than $\frac{1}{16}$ inch.
- (3) Outside top edges of launcher beam machined surfaces at the forward end of the beam which should be $1\frac{5}{32}$ inch from the wire (center line of the beam); the launcher beam is unserviceable if measurements are more than $2\frac{3}{32}$ inch or less than $1\frac{1}{32}$ inch.

h. Frequency of Check. The launcher beam should be checked for straightness at least once every 30 days under normal operation. The interval may be reduced during periods of extensive travel and/or operation in extremely hot or cold temperature. The interval may also be extended during inactive periods.

CHAPTER 7

MAINTENANCE AND INSPECTIONS

55. Requirements

Maintenance and inspection are essential to insure that the section is prepared to carry out its mission immediately. Systematic maintenance and inspection drills provide the best insurance against unexpected breakdown at the critical moment when maximum performance is essential.

56. Disassembly, Adjustment, and Assembly

Disassemblies and adjustments of the launcher authorized to be performed by battery personnel are prescribed in TM 9-1055-202-10 supplemented by instructions contained in Department of the Army supply manuals. No deviation from these procedures is permitted unless authorized by the responsible ordnance officer.

57. Records

The principal records pertaining to the weapon are the Equipment Log Book; DA Form 2404 (Equipment Inspection and Maintenance work sheet) and DA Form 2407 (Maintenance Request). For detailed information on these forms, see TM 38-750.

58. Maintenance

For detailed instructions concerning maintenance of the 762-mm truck-mounted rocket launcher M289, see TM 9-1055-202-10, LO 9-3060, and TM 38-750.

59. Inspections

Regular inspections are required to insure that materiel is maintained in serviceable condition.

a. The chief of section is responsible for the equipment within his section. He should inspect it thoroughly each day. If he sees the need for repair or adjustment, he notifies the platoon commander immediately so that the necessary corrective action may be taken.

b. The platoon commander should make a daily informal inspection. He inspects different parts of the materiel each day to insure complete coverage every few days. At least once a month, the platoon commander makes a thorough mechanical inspection of the launcher, section vehicles, ancillary equipment, tools, and spare parts.

c. Battery, battalion, and higher commanders should make frequent command inspections to assure themselves that the equipment in their command is being maintained at prescribed standards of appearance, condition, and completeness.

d. For details on inspecting the sections equipment, see TM 9-1055-202-10, TM 9-1055-202-20, and TM 11-6660-203-35. Deficiencies found during inspections should be remedied promptly.

e. Inspections will be routine, thorough, and rapid by following the drill outlined in this chapter. When the section is reduced in strength, the chief of section must reassign duties to insure that all maintenance steps are completed.

60. Operational Services

First-echelon maintenance on section vehicles as prescribed by a daily service is performed by the driver and the crew *each* day the vehicle is operated. This service is divided into three parts.

a. *Before-operation service* is a brief service to determine if the vehicle is ready for operation. At this time the chief of section verifies that sufficient equipment, tools, and rations are available and secured.

b. *During-operation service* consists of detecting any unsatisfactory performance of the vehicle.

c. *After-operation service* prepares the vehicle to operate again on a moments notice. This is the basic daily service for the vehicle, and it is particularly important to detect deficiencies that developed during operation. All defects that the driver and crew cannot remedy must be reported at this time. The chief of section will resupply, as required, and verify that all equipment is present.

CHAPTER 8

DECONTAMINATION OF EQUIPMENT

61. General

a. Equipment contaminated with chemical, biological, or radiological agents constitutes a hazard to personnel and must be removed or neutralized.

b. Decontamination is the process of covering, removing, or destroying contamination or changing the contaminating agent or agents into harmless substances.

c. Decontamination must be started as soon as possible in order to reduce hazards and allow safe operation of equipment.

62. Decontamination of Toxic Chemical Agents

Table VIII prescribes the methods for decontaminating toxic chemical agents.

Table VIII. Decontamination of Toxic Chemical Agents

Contaminated object	Preferred decontamination methods	Alternate decontamination methods	Field expedient methods
Canvas-----	Boil in soapy water for 1 hour. Use 5 percent solution of household bleach for V-agents. Use 5 percent solution of washing soda for G-agents.	Immerse in boiling water for 1 hour. Launder by standard methods. Use DANC ¹ solution or DS2 ¹ . Use slurry ² .	Aerate (except for V-agents).
Clothing-----	Immerse and stir in boiling soapy water for 1 hour. Add 1 pound of soap to each 10 gallons of water. Use 5 percent solution of bleach for V-agents. Use 5 percent solution of washing soda for G-agents.	Launder by standard methods. Dry clean. Use DS2 for cotton items only.	Rub M5 ointment on small contaminated areas. Aerate (except for V-agents).
Unpainted metals--	Use DS2 or DANC, then rinse or wipe with organic solvent ³ , and dry.	Wash with cool, soapy water ¹ and rinse.	Aerate.
Painted-----	Spray with DS2 or DANC solution.	Wash with hot, soapy water and rinse. (Slurry may be used if it is removed within 1 hour and the surface is oiled.)	Aerate. Weather.
Instruments-----	Clean with alcohol (or gasoline) and apply a thin coat of oil.	Wipe with rag dampened with DANC or DS2, dry with clean rag, and oil.	Weather.

¹ These decontaminants are injurious to plastic and hard rubber.

² Equal weights of water and chloride of lime.

³ Organic solvents (petroleum products) and water do not neutralize contaminants. Precautions must be taken to dispose of these solvents as contaminated materiel.

63. Decontamination of Biological Agents

Decontaminants and decontamination procedures for toxic chemical agents are effective against biological agents.

64. Decontamination of Radiological Agents

a. *Radioactive contaminants* cannot be made

safe by chemical action. They must be removed or shielded, if it is impracticable to wait for natural decay.

b. *Decontamination* is the process of *reducing* the hazard by removing the contaminant or shielding against radiation. Methods for decontamination are given in table IX.

Table IX. Decontamination of Radiological Agents

Method	Contaminated object	Technique	Remarks
Wash and scrub with water.	All nonporous surfaces (metal, paint, plastics).	Work from top to bottom and upwind.	Drainage must be controlled—water is contaminated.
Detergent (soap) solution.	All nonporous surfaces.	Heat water if possible. Rub surface and wipe dry. (Moist application is all that is desired; do not let drip.)	Rags and runoff require disposal.
Organic solvents. (Petroleum).	All nonporous surfaces.	Immerse or wash with solvent, then wash in hot soapy water, and rinse with clear water.	Vapor is toxic. Fire precautions are required.
Brushing-----	Porous and nonporous surfaces.	Brush or sweep dust from equipment or clothing.	Limited control of contaminated dust. Wear protective mask.

Hot spots may be reduced by sanding, filing, or grinding. These methods are not practical for large areas—a protective mask and gloves must be worn.

Launder-----	Clothing-----	Use hot soapy water and rinse with clear water.	Water requires disposal.
Bathing and scrubbing.	Personnel-----	Use brushes, running water, and soap.	Continue scrubbing until contamination level is safe.

CHAPTER 9

DESTRUCTION OF EQUIPMENT

65. General

a. Tactical situations may require that equipment be abandoned in the combat zone. All abandoned equipment must be destroyed to prevent its use by the enemy.

b. The destruction of equipment, subject to capture or abandonment in the combat zone, will be undertaken only upon authority delegated by division or higher commanders.

c. All batteries must prepare plans for destroying their equipment in order to reduce the time required if destruction should become necessary.

66. Principles To Be Followed

a. Plans for destruction of equipment must be adequate, uniform, and easily carried out in the field.

b. Destruction must be as complete as the available time, equipment, and personnel will permit. Since complete destruction requires considerable time, the more essential parts are destroyed first.

c. The same essential parts must be destroyed on all like units to prevent the enemy from constructing complete units from damaged ones.

d. Spare parts and accessories must be given the same priorities as the parts installed on the equipment.

67. Methods

a. The most generally applicable methods of destruction are—

- (1) *Mechanical*. Requires ax, pick, sledge or similar equipment.
- (2) *Burning*. Requires gasoline, oil, or other flammables.
- (3) *Demolition*. Requires ammunition or explosives.
- (4) *Gunfire*. Requires artillery, rocket launcher, or rifle grenades.

b. In general, the destruction of essential parts, followed by burning, is sufficient to render the weapon useless.

c. Destruction of the 762-mm rocket involves the destruction of the highly sensitive propellant. For detailed methods of destruction, see TM 9-1340-202-12. If the nuclear warhead section is also to be destroyed, refer to TM 9-1100-200-12. If at all possible, the rocket should be fired to prevent capture even if there is no target immediately available.

CHAPTER 10

SAFETY

68. General

Safety precautions to be observed in training are prescribed in AR 385-62. Additional information on safety is found in FM 6-140 and TM 9-1900. Safety precautions peculiar to the 762-mm rocket are given in paragraphs 69 through 72.

69. Safety Data

a. Personnel and equipment must be kept clear of the propellant blast at the time of firing. The minimum safety limits for the MGR-1B rocket are 300 meters to the front of the launcher, 90 meters to each side of the launcher, and 400 meters to the rear of the launcher. For the MGR-1A series, the minimum safety limits are 100 meters to the front of the launcher, 90 meters to each side of the launcher, and 400 meters to the rear of the launcher. The 400-meter dimensions to the rear of the launcher may be reduced to 200 meters at the discretion of the unit commander.

b. During rocket checkout, the assembly specialist will keep in his possession the safety plug that enables him to operate the firing box. To avoid accidental firing of the rocket, all personnel must remain clear of the firing box M35 (or blasting machine as appropriate) until the chief of section indicates that the rocket is ready to be fired.

c. Extreme caution should be used in handling the igniter assembly, which contains black powder easily ignited by heat, friction, impact or static charge, (MGR-1A series).

Warning: Disassembly of the igniter is prohibited.

d. The number of personnel engaged in the preparation of rockets for firing will be the

minimum necessary to accomplish the operation.

e. Flammable liquids used in storage or assembly shelters will be kept in approved safety cans and will not be stored in the shelter.

f. Photo flashbulbs or photo floodlights will not be used in photographing operations when explosives or flammable liquids are present.

g. All rocket motors in administrative storage will be pointed in the same direction; i.e., the direction which would result in the least damage in event of accidental ignition of the propelling charge.

h. Care must be taken at all times to prevent rockets from being ignited by electrical currents from electric tools, lights, or electrical cords.

i. Operations involving drilling equipment of any type will not be used in the modification of parts on a rocket containing explosives.

j. After the spin rockets are connected to the battery and switch assembly, all work on the rocket is accomplished from the left side.

70. Safety Features

a. *Shorting Plugs.* Shorting plugs are provided as a means of preventing the accumulation of stray voltage in the firing lines. Stray voltage can cause the rocket to fire prematurely. Shorting plugs must be removed for electrical tests of the rocket; at all other times they must be left in place until immediately prior to firing.

b. *Rocket Motor Shipping Plug, MGR-1A Rocket.* The rocket motor shipping plug provides a forward release for the propellant gases in case of accidental ignition. This plug, made of steel with a brass insert, should not be removed until immediately prior to firing.

c. Motor Igniter, MGR-1B Rocket. The rocket motor is shipped with the igniter installed. While the igniter is in the safe condition, a retainer holds it in place. In case of accidental ignition, the igniter will blow out, rendering the rocket motor non-propulsive.

71. Misfires

a. In the event of a misfire, make an immediate attempt again to fire. If the rocket does not fire at once do the following:

- (1) If the Firing Panel Box M35 is connected to vehicular battery power, operate the vehicle motor and again attempt to fire. If this does not fire the rocket, switch the M35 to BA 605/U power, using both batteries.
- (2) If the M35 was initially operating off the BA 605/U batteries, do the following:
 - (a) If only one battery was used, attempt to fire again using two BA 605/U batteries. If it does not then fire, check to determine whether the batteries operated. If either or both failed to operate, replace the defective battery, and repeat this step. If both operated and the rocket did not fire, switch the M35 to vehicular power, operate the vehicle motor, and attempt to fire again.

(b) If two batteries were used initially, and both operated, switch to vehicular power, operate the vehicle motor, and attempt to fire again.

- (3) If, after the above procedures, the rocket still fails to fire, wait 30 minutes before approaching the rocket.

b. While waiting, repeat the final continuity test.

c. After waiting 30 minutes, troubleshoot the electrical circuit to determine cause of failure. If the fault is detected and repair effected, attempt again to fire. If it still fails to fire, wait another 30 minutes and remove the igniter to the test pit and inspect and test it (MGR-1A). If the trouble lies in the igniter, replace it and attempt to fire.

d. If the rocket still fails to fire, wait 30 minutes and remove it to a safe location and notify Ordnance personnel.

72. Drill and Firing

a. Members of the section must be trained to stay clear of the propellant blast area in rear of launcher (para. 69a).

b. In training, there must be a safety officer for each artillery unit that is firing. For duties of the safety officer, see FM 6-40.

CHAPTER 11

TRAINING

Section I. GENERAL

73. Purpose and Scope

The purpose of this chapter is to present the minimum requirements for training the personnel of a firing section in the performance of their duties. It includes general information on the conduct of training and a minimum training schedule.

74. Objectives

The objectives are to train crewmen to perform their individual duties rapidly and, through drill, to weld them into an efficient, coordinated team able to function effectively in combat. During training, supervisors should keep in mind the proficiency sought in Army Training Test 6-175. Maximum efficiency is attained through fundamental, repetitive drills.

75. Conduct of Training

a. Training will be conducted in accordance with the principles given in FM 21-5. The goal

of training should be the standards set forth in FM 6-125, ATP 6-302, and AR 611-201.

b. In general, individual training is conducted by noncommissioned officers as far as practicable. Unit officers usually prepare training plans, conduct unit training, and supervise and test individual training.

c. Throughout training, the application of prior instruction to current training must be emphasized.

d. The status of the training received by each individual in the section is the responsibility of the chief of section. Progress of the section must be frequently checked by the platoon commander to insure that the high standards of training required are being maintained. However, the platoon commander should be careful not to usurp the prerogatives and responsibilities of the section chief. The development of leadership and initiative in noncommissioned officers must be emphasized constantly throughout training.

Section II. MINIMUM TRAINING SCHEDULE

76. General

The training schedule outlined in paragraph 78 is a guide to meet the minimum training requirements in subjects covered in this manual for personnel of a firing section.

77. Individual Periods

a. Individual periods of training in service of the launcher should be arranged with other battery training to form a well-balanced training program.

b. In general, except for RSOP, service practice, and crew drill, periods on any subject should not be longer than 1 hour.

c. Crew drill periods should be preceded and followed by periods on subjects that will be logically related to the drill. For example, a period of crew drill should be preceded by a period of testing and adjustment of sighting and fire control equipment and followed by a period on inspection and maintenance drills.

d. TM 9-1055-202-10 provides information on which to base periods of instruction on description, characteristics, and functioning of the launcher; familiarization with the launcher, equilibrators, elevating mechanism, sighting and fire control equipment, and field assembly and malfunction. These should be included in the unit training schedule and should be closely

allied with the training in service of the launcher. Approximately 8 hours should be devoted to this instruction.

e. Additional service-of-the-launcher training may be performed during unit training exercises.

78. Training Schedule

Method	Periods	Subject	Text references	Training aids and equipment
C, D, PW----	1 (1-hour period)	Organization and composition of firing section; general duties of individuals; formation of firing section.	Para. 6 and 7---	TOE section equipment, M329 rocket trailer, and M62 or M543 wrecker.
C, D, PW----	6 (4-hour periods)	Crew drill (duties in loading, preparation for action, indirect laying, firing, and march order).	Para. 8-26-----	Do.
C, D, PW----	5 (1-hour and ½ hour periods).	Testing and adjustment of sighting and fire control equipment.	Para. 39-54-----	Do.
C, D, PW----	4 (1-hour periods)	Inspection and maintenance drills----	Para. 55-60-----	TOE section equipment.
C, D, PW----	1 (1-hour period)	Decontamination of equipment-----	Para. 61-64-----	Decontamination equipment and TOE equipment.
C, D, PW----	1	Destruction of materiel to prevent use by the enemy.	Para. 65-67-----	Demolition and TOE equipment.
C, D-----	1 (1-hour period)	Safety precautions-----	Para. 68-72-----	TOE equipment.
PW-----	8 (8-hour periods)	RSOP and service practice-----	All previous references.	Do.
C, PW-----	6 (1-hour periods)	Review and tests of subjects previously covered.	All previous references.	Do.

C—conference; D—demonstration; PW—practical work.

CHAPTER 12

TESTS FOR QUALIFICATION OF GUNNERS

Section I. GENERAL

79. Purpose and Scope

This chapter prescribes the tests to be given in the qualifications of gunners. These tests should be given to all members of the firing sections after completion of their individual training phase. The purpose of the tests is—

a. To provide a means of determining the relative proficiency of the individual crew member in the performance of the duties of the gunner and in his knowledge of the rocket launcher M289. The tests will not be a basis for determining the relative proficiency of batteries or higher units.

b. To serve as an adjunct to training.

80. Standards of Precision

The candidates will be required to perform the tests in accordance with the standards listed below.

a. Scale settings must be exact, and matching indexes must be brought into coincidence.

b. Level bubbles must be exactly centered.

c. The vertical hair in the reticle of the panoramic telescope must be alined on the objective lens of the aiming circle or on exactly the same part of the aiming point or target each time the launcher is laid.

d. Final motions of azimuth and elevation setting knobs, as well as traversing and elevating handwheels, must be made in the appropriate direction. When elevating, the final motion of the handwheel should be in the direction of the more difficult movement. Final motion for traversing is from left to right. Final movement of the vertical hair of the telescope is from left to right.

81. Assistance

The candidate will receive no unauthorized assistance. Each candidate may select author-

ized assistants as indicated in the tests. In the event a candidate fails any test because of the fault of the examiner or any assistant, the test will be disregarded, and the candidate will be retested.

82. Time

The time for any test will be the time from the last word of the command to the last word of the candidate's report. The candidate may begin any test after the first word of the first command.

83. Scoring

Scoring will be conducted in accordance with the two paragraphs *Penalties* and *Credit* under each test. If a test is performed correctly, credit will be given in accordance with the paragraph *Credit* under each test. No credit will be allowed if conditions exist as specified in the paragraphs titled *Penalties*.

84. Preparation for Tests

The launcher will be prepared for action and the candidate will be posted at the proper position corresponding to the test being conducted or as indicated in the paragraphs entitled "Special instructions." The examiner will insure that the candidate understands the requirements of each test and will require the candidate to report, "I am ready," before each test.

85. Qualification Scores

Minimum scores required for qualification in the courses are as follows:

	<i>Individual classification</i>	<i>Points</i>
Expert gunner	-----	90
First-class gunner	-----	80
Second-class gunner	-----	70

86. Outline of Tests

Section	Subject	Number of tests	Points each	Maximum credit
II-----	Indirect laying, deflection only-----	18	2	36
III-----	Laying for quadrant elevation with gunner's quadrant-----	4	4	16
IV-----	Measuring site to the mask-----	1	6	6
V-----	Measuring quadrant-----	1	6	6
VI-----	Measuring deflection-----	2	5	10
VII-----	Tests and adjustment of sighting and fire control equipment-----	4	4	16
VIII-----	Materiel-----	1	10	10
	Total credit-----	----	----	100

Section II. INDIRECT LAYING, DEFLECTION ONLY

87. Scope of Tests

Eighteen tests will be conducted in which the candidate will be required to execute commands similar to those given in paragraph 89. Tests 1 through 4 (and tests 5-9, 10-13, and 14-18) will be executed as one series of commands.

88. Special Instructions

a. Commands will not necessitate shifting the launcher.

b. The examiner will select a suitable aiming point and identify it to the candidate.

c. The command for new deflections for each test will be within the following prescribed limits:

Test number	Maximum change (mils)	Minimum change (mils)
2 and 11-----	180	140
3 and 12-----	90	70
4 and 13-----	40	20
7 and 16-----	100	60
8 and 17-----	50	30
9 and 18-----	20	10

d. The launcher will be laid with correct settings at the conclusion of each test.

e. The examiner will designate the launcher that is to be used. The examiner will announce special corrections in deflection that are to be applied by the candidate.

89. Outline of Tests

Test number	Examiner commands (for example)	Action of candidate
1 and 10.	DEFLECTION 2890-----	Sets deflection 2890. Centers cross- and longitudinal-level bubbles. Traverses launcher until vertical reticle is on the center of the objective lens of the aiming circle. Checks centering of bubbles. Relays if necessary. Calls "Ready" and steps clear.
2 and 11.	DEFLECTION 2746-----	Same as test 1 above (sets deflection 2746).
3 and 12.	DEFLECTION 2863-----	Same as test 1 above (sets deflection 2863).
4 and 13.	DEFLECTION 2829 At conclusion of test 4(13) give CEASE FIRE, END OF MISSION. (No time considered for operation.)	Same as test 1 above (sets deflection 2829). Sets deflection 2800; lays on aiming circle. Checks centering of bubbles. Relays if necessary.
5 and 14.	AIMING POINT, CHURCH STEEPLE, REFER.	Refers telescope to church steeple. Reads deflection and calls "Number 1, deflection (so much)."
6 and 15.	DEFLECTION 2800, REFER-----	Slips the azimuth micrometer scale to 0. Slips the azimuth scale to 2800. Verifies that vertical reticle is on church steeple. Calls "Number 1, deflection 2800." Steps clear.
7 and 16.	DEFLECTION 2891-----	Same as test 1 above (sets deflection 2891).
8 and 17.	DEFLECTION 2853-----	Same as test 1 above (sets deflection 2853).
9 and 18.	DEFLECTION 2869-----	Same as test 1 above (sets deflection 2869).

90. Penalties

a. No credit will be allowed if, after each test—

- (1) The deflection is set incorrectly.
- (2) The cross- or longitudinal-level bubble is not centered.
- (3) The vertical reticle of the telescope is not on the aiming point or the center of the objective lens of the aiming circle, whichever is applicable.

b. No credit will be allowed if the last motion of the traverse handwheel was not made to the right.

91. Credit

a. Tests 1, 6, 10, and 15 (each).

<i>Time in seconds</i>	<i>Credit</i>
40 or less-----	2.0
More than 40 but not more than 45-----	1.5
More than 45 but not more than 50-----	1.0
More than 50-----	0

b. Tests 2, 3, 4, 5, 7, 8, 9, 11, 12, 13, 14, 16, 17, and 18 (each).

<i>Time in seconds</i>	<i>Credit</i>
25 or less-----	2.0
More than 25 but not more than 30-----	1.5
More than 30 but not more than 35-----	1.0
More than 35-----	0

Section III. LAYING FOR QUADRANT ELEVATION WITH GUNNER'S QUADRANT

92. Scope of Tests

Four tests will be conducted in which the candidate will be required to execute commands similar to those given in paragraph 93.

93. Special Instructions

a. The gunner's quadrant will be set at 0 for the first test.

b. Each succeeding test will require a change of quadrant elevation setting within the limits of 30 to 60 mils.

c. The candidate will be posted to the right of the launcher facing the quadrant seats, with the gunner's quadrant in hand.

d. An assistant (launcher driver) will be selected by the candidate to power elevate the launcher.

94. Outline of Tests

Test number	Examiner commands (for example)	Action of candidate
1	QUADRANT 180----	Sets quadrant elevation on gunner's quadrant. Seats quadrant. Directs driver to elevate or depress the launcher beam until the quadrant bubble is approximately centered. Centers bubble with manual elevating handwheel. Calls "Ready" and waits for examiner to verify laying.
2	QUADRANT 239----	Same as test 1 above.
3	QUADRANT 196----	Same as test 1 above.
4	QUADRANT 155----	Same as test 1 above.

95. Penalties

a. No credit will be allowed if, after each test—

- (1) The quadrant elevation is set incorrectly.
- (2) The quadrant is not properly seated.
- (3) The quadrant bubble is not properly centered.

b. No credit will be allowed if the last movement of the launcher beam was not in the direction in which it is most difficult to turn the elevating handwheel.

96. Credit

<i>Time in seconds</i>	<i>Credit</i>
25 or less-----	4.0
More than 25 but not more than 30-----	3.0
More than 30 but not more than 35-----	2.0
More than 35-----	0

Section IV. MEASURING SITE TO MASK

97. Scope of Test

One test will be conducted in which the candidate will be required to execute the command MEASURE SITE TO MASK (para. 90).

98. Special Instructions

a. The launcher, prepared for action, will be placed 200 to 400 meters from a mask of reasonable height.

b. The launcher beam will be pointed so that it is 100 to 150 mils above the crest and 100 to 150 mils right or left of the highest point of the crest.

c. The candidate will take his post at the rear of the launcher beam.

d. Assistants, selected by the candidate, will be posted to traverse and elevate the launcher beam.

99. Outline of Test

Examiner commands	Action of candidate
MEASURE SITE TO MASK.	Sights along lowest element of launcher rail and has assistants operate elevating and traversing mechanisms until line of sight

Examiner commands	Action of candidate
	just clears crest. Measures elevation with gunner's quadrant. Reports "Number () site to mask ()."

100. Penalties

No credit will be allowed if—

a. The line of sight along the lowest element of the launcher rail does not just clear the crest.

b. The longitudinal-level bubble is not properly centered.

c. The site is announced incorrectly.

d. The last movement of the launcher beam was not in the direction in which it is most difficult to turn the elevating handwheel.

101. Credit

	Time in seconds	Credit
60 or less	-----	6.0
More than 60 but not more than 70	-----	4.5
More than 70 but not more than 80	-----	3.0
More than 80 but not more than 90	-----	1.5
More than 90	-----	0

Section V. MEASURING QUADRANT

102. Scope of Test

One test will be conducted in which the candidate will be required to measure the quadrant elevation by means of the gunner's quadrant.

103. Special Instructions

Prior to the test, the examiner will lay the launcher at a selected quadrant, measure the quadrant, and then set the gunner's quadrant at 0.

104. Outline of Tests

Examiner commands	Action of candidate
MEASURE THE QUADRANT.	Places gunner's quadrant on seats. Levels bubble by raising or lowering the index arm and turning the micrometer knob.

Examiner commands	Action of candidate
	Announces "Number (), quadrant ()" and hands quadrant to examiner.

105. Penalties

No credit will be allowed if—

a. The quadrant bubble is not centered when the quadrant is seated properly.

b. The quadrant is announced incorrectly.

106. Credit

	Time in seconds	Credit
10 or less	-----	6.0
More than 10 but not more than 12	-----	5.0
More than 12 but not more than 14	-----	4.0
More than 14 but not more than 16	-----	3.0
More than 16	-----	0

Section VI. MEASURING DEFLECTION

107. Scope of Test

Two tests will be conducted in which the candidate will be required to measure and report a deflection in accordance with command given in paragraph 109.

108. Special Instructions

a. The launcher will be laid on the aiming circle.

b. An aiming point within 200 mils to the left or right of the launcher will be designated by the examiner and identified by the candidate.

109. Outline of Test

Examiner commands	Action of candidate
NUMBER (), AIMING POINT THAT () REFER.	Centers cross- and longitudinal-level bubbles. Refers to aiming point. Checks centering of bubbles and re-

Examiner commands	Action of candidate
	lays telescope, if necessary. Reads deflection and reports. "Number (), deflection ()" and steps clear.

110. Penalties

No credit will be allowed if—

a. The cross- or longitudinal-level bubble is not centered properly.

b. The vertical reticle of the telescope is not properly alined on the aiming point.

c. The deflection is announced incorrectly.

d. The traversing handwheel is turned.

111. Credit

Time in seconds	Credit
6 or less	5.0
More than 6 but not more than 7	3.0
More than 7 but not more than 8	2.0
More than 8	0

Section VII. TESTS AND ADJUSTMENTS OF SIGHTING AND FIRE CONTROL EQUIPMENT

112. Scope of Tests

Four tests will be conducted in which the candidate will be required to demonstrate the methods employed in making the prescribed tests and authorized adjustments or to describe the action taken (i.e., send to the ordnance support unit) if adjustment is not authorized to be made by using personnel.

113. Special Instructions

a. The launcher will be prepared for these tests as indicated in chapter 6.

b. The equipment needed for the tests is listed in paragraph 40.

c. The candidate will select assistants to elevate the launcher at the direction of the candidate during tests 1 and 2 and install the bore-

sighting bracket at the direction of the candidate prior to test 4.

d. The tests will be conducted in the chronological sequence indicated in chapter 6. After completion of test 2, the gunner's quadrant used in tests 1 and 2 will be used for test 3 with the proper correction, determined in test 1, carried on the quadrant. If the correction exceeds 0.4 mil, a different quadrant will be used.

e. Adjustments which the candidate may be required to accomplish will fall within the following limits:

- (1) Panoramic telescope azimuth scale, not to exceed one 100-mil graduation.
- (2) Panoramic telescope slipping azimuth micrometer scale, not to exceed ten 1-mil graduations.

114. Outline of Tests

Test number	Examiner commands	Action of candidate
1	PERFORM END-FOR-END TEST ON GUNNER'S QUADRANT.	Performs test as prescribed in paragraph 46. Calls "Error () mils, quadrant serviceable (unserviceable)" and hands quadrant to examiner for verification.
2	PERFORM MICROMETER TEST ON GUNNER'S QUADRANT.	Performs test as prescribed in paragraph 47. Calls "Quadrant micrometer is (is not) in error."
3	TEST TELESCOPE MOUNT. Caution: Do not turn cross-leveling or longitudinal-leveling knobs of the telescope mount after this test.	Performs test and makes adjustments, if necessary, as prescribed in paragraph 50. Calls "Cross- (longitudinal-) level bubble(s) within (outside) allowable limit."
4	TEST ADJUSTMENT OF PANORAMIC TELESCOPE.	Performs tests and makes adjustments as prescribed in paragraph 51. Calls "Ready" and steps clear.

115. Penalties

a. General. These tests are not essentially speed tests. The purpose of the prescribed time limits is to insure that the candidate can perform the operation without wasted effort.

b. Test 1. No credit will be allowed if—

- (1) The bubble of the gunner's quadrant does not center when verified by the examiner.
- (2) The error (one-half of the value indicated when the quadrant was first reversed and the bubble centered by the moving index arm and micrometer) is announced incorrectly by the candidate.
- (3) The candidate fails to declare the quadrant unserviceable if the error (necessary correction) exceeds 0.4 mil or fails to declare the quadrant serviceable if the error (necessary correction) is 0.4 mil or less.
- (4) The time to complete the test exceeds 3 minutes.

c. Test 2. No credit will be allowed if—

- (1) The procedure is not followed correctly.
- (2) The time to complete the test exceeds 2 minutes.

d. Test 3. No credit will be allowed if—

- (1) The bubble of the gunner's quadrant is not centered in either direction.

(2) The candidate does not announce correctly the status of either the cross- or the longitudinal-level bubble.

(3) The time to complete the test and adjustments exceeds 6 minutes.

e. Test 4. No credit will be allowed if—

- (1) The candidate fails to make any adjustment when such adjustment is indicated.
- (2) The zero mark of either the azimuth scale or the azimuth scale micrometer is not in coincidence with its respective index.
- (3) The line of sight of the telescope does not fall on the correct sighting point on the boresighting bracket when all scales are set at 0.
- (4) The time to complete the tests and adjustments exceeds 7 minutes.

116. Credit

a. The candidate will be scored on the general merit of his work in addition to the specific requirements above.

b. If the tests and adjustments are performed correctly within the prescribed time limit, maximum credit will be given as follows:

Test 1	4
Test 2	4
Test 3	4
Test 4	4
Total	16

Section VIII. MATERIEL

117. Scope of Test

The candidate will be required to perform one test as outlined in paragraph 119.

118. Special Instructions

a. A complete set of lubrication equipment authorized for use of battery personnel will be made conveniently available on a tarpaulin adjacent to the launcher.

b. Every type of lubricant used on the launcher will be placed conveniently on the tarpaulin in plainly labeled containers.

119. Outline of Tests

Examiner commands	Action of candidate
PERFORM DAILY AND QUARTERLY LUBRICATION.	Selects proper lubricating equipment and lubricant and shows <i>how</i> and with <i>which lubricant</i> each lubrication point is serviced. (Actual lubrication is not performed.)

120. Penalties

a. This test is not essentially a speed test. The purpose of the maximum time is to insure that the candidate can perform the operations without wasted effort.

b. No credit will be given if the time to complete the test exceeds 10 minutes.

121. Credit

a. The candidate will be scored on the general merit of his work in addition to the specific requirements above.

b. If the test is performed correctly within the prescribed time limit, maximum credit of 10 will be given.

APPENDIX I

REFERENCES

AR 320-5	Dictionary of United States Army Terms.
AR 385-62	Firing Guided Missiles and Heavy Rockets for Training, Target Practice and Combat.
AR 611-201	Manual of Enlisted Military Occupational Specialties.
AR 750-5	Organization, Policies, and Responsibilities for Maintenance Operation.
ATP 6-302	Field Artillery Missile Units, HONEST JOHN and LITTLE JOHN Rockets.
ATT 6-175	Field Artillery Missile Battalion (Battery), HONEST JOHN and LITTLE JOHN, Rocket.
DA Pam 108-1	Index of Army Motion Pictures, Filmstrips, Slides, Tapes, and Phonorecordings.
DA Pam 310-series	Index of Military Publications.
FM 1-100	Army Aviation.
FM 5-15	Field Fortifications.
FM 5-20	Camouflage, Basic Principles and Field Camouflage.
FM 5-25	Explosives and Demolitions.
FM 6-20-2	Field Artillery Techniques.
FM 6-40-1	Field Artillery HONEST JOHN/LITTLE JOHN Rocket Gunnery.
FM 6-61	Field Artillery Missile Battalion, HONEST JOHN Rocket, Self-Propelled.
FM 6-125	Qualification Tests for Specialists, Field Artillery.
FM 6-140	The Field Artillery Battery.
FM 21-5	Military Training.
FM 21-30	Military Symbols.
FM 21-40	Small Unit Procedures in Chemical, Biological, and Radiological (CBR) Operations.
FM 21-60	Visual Signals.
FM 22-5	Drill and Ceremonies.
FM 31-70	Basic Cold Weather Manual.
TB 9-1000-212-20	Launcher, 762-mm Rocket, Truck-Mounted, M289, and M386: Inspection Procedures and Straightness Standards for Launching Beam of Materiel in Hands of Troops.
TM 3-220	Chemical, Biological, and Radiological (CBR) Decontamination.
TM 5-200	Camouflage Nets and Net Sets.
TM 9-238	Deep Water Fording of Ordnance Materiel.
TM 9-247	Materials Used for Cleaning, Preserving, Abrading and Cementing Ordnance Materiel; and Related Materials, Including Chemicals.
TM 9-575	Auxiliary Sighting and Fire Control Equipment.
TM 9-1055-202-10	Operator's Manual: Truck-Mounted 762-mm Rocket Launcher, M289.
TM 9-1055-202-20	Organizational Maintenance Manual: Truck-Mounted, 762-mm Rocket Launcher M289.

TM 9-1055-203-15	Operation and Maintenance: Truck-Mounted 762-mm Rocket Heating and Tiedown Unit M78A1.
(S) TM 9-1100-200-12	Operator and Organizational Maintenance Manual: (Prelaunch Procedures): HONEST JOHN Atomic Warhead Section M27, M47, M48, and Training Warhead Section M72 (U).
TM 9-1340-202-12	Operator and Organizational Maintenance Manual: 762-mm Rockets M31 and M50 series (HONEST JOHN Rocket System).
TM 9-1375-200	Demolition Materials.
TM 9-1527	Ordnance Maintenance: Gunner's Quadrants M1 and M1918 and Machinegun Clinometer M1917.
TM 9-1900	Ammunition, General.
TM-9-2320-211-10	Operator's Manual: Truck, Chassis: 5-ton, 6x6, M39, M40, M40C, M61, M63, M63C, M139, M139C, M139D, M139F; Truck, Cargo: 5-ton, 6x6, M41, M54, M54A1, M55; Truck, Dump: 5-ton, 6x6, M51; Truck, Wrecker: Medium, 5-ton, 6x6, M62; Truck Tractor, Wrecker: M246; Truck, Wrecker: Medium, 5-ton, 6x6, M543.
TM 9-2320-211-20	Organizational Maintenance Manual for Truck, Chassis: 5-ton, 6x6, M39, M40, M40C, M61, M61A2, M63, M63C, M139, M139C, M139D, M139F; Truck Cargo: 5-ton, 6x6, M41, M54, M54A1, M54A2, M55, M55A2; Truck, Dump: 5-ton, 6x6, M51, M51A2; Truck, Tractor: 5-ton, 6x6, M52, M52A1, M52A2; Truck, Wrecker: Medium, 5-ton, 6x6, M62, M543, M543A2; Truck Tractor, Wrecker: 5-ton, 6x6, M246.
TM 9-2330-223-15	Operator, Organizational, Field and Depot Maintenance Manual: Trailer, Transporter, 762-mm rocket, 4-wheel, M329 (2330-046-1733); Trailer, Transporter, 762-mm rocket, 4-wheel, M329A1 (2330-508-1483).
TM 9-6103	Ordnance Maintenance: Telescope Mounts M3A1, M18A1, M21A1, M25, M30, M44, M44A1, M69, and M76.
TM 9-6147	Ordnance Maintenance: Panoramic Telescopes: M12A7C, M12A7D, M12A7F, M12A7G, M12A7H, and M12A7K (M12A7E4).
TM 9-8022	Operation and Organizational Maintenance: 2½-ton, 6x6, (Reo) Chassis, Trucks: M44, M45, M46.
TM 11-6660-203-10	Operator's Manual: Wind Measuring Sets AN/MMQ-1, AN/MMQ-1A, AN/MMQ-1B, and AN/PMQ-6.
TM 11-6660-203-20P	Organizational Maintenance Repair Parts and Special Tool Lists: Wind Measuring Sets AN/MMQ-1, AN/MMQ-1A, AN/MMQ-1B, AN/PMQ-6, and AN/PMQ-6A.
TM 21-300	Driver Selection and Training (Wheeled Vehicles).
TM 21-305	Manual for the Wheeled Vehicle Driver.
TM 38-750	Army Equipment Record Procedures.
TOE 6-175E	Field Artillery Battalion, HONEST JOHN, Armored Division; or Field Artillery Battalion, HONEST JOHN, Infantry Division; or Field Artillery Battalion, HONEST JOHN, Infantry Division, mechanized.
TOE 6-525D	Field Artillery Missile Battalion, HONEST JOHN Rocket, Self-Propelled.

APPENDIX II

ROCKET ASSEMBLY AND TRANSPORT SECTION

Section I. GENERAL

1. Purpose and Scope

This appendix is a guide to assist commanders of 762-mm rocket units in developing the rocket assembly and transport (A&T) sections into efficient, smooth working teams that have a sense of discipline to impel them to operate effectively under the stress of battle. This appendix prescribes general and individual duties of section personnel and procedures for handling, transporting, assembling, and testing of rockets.

2. Section Drill

Section drill is not prescribed for the assembly and transport section; however, commanders may appropriately adapt the provisions of chapter 3 to this section as desired.

3. References

Publications pertaining to related matters not discussed in detail in this appendix are listed in appendix I.

Section II. ORGANIZATION

4. Composition of the Assembly and Transport Section

a. The assembly and transport section consists of section personnel and the necessary vehicles and handling equipment required to assemble, test, store, and transport rockets and warheads. The section is capable of testing and assembling two rockets simultaneously for limited periods.

b. The assembly and transport section consists of 14 members. A minimum of six is required for assembly. The personnel in the assembly and transport section are as follows:

- (1) Ammunition officer.
- (2) Chief of section.
- (3) Two senior assembly specialists.
- (4) Two assembly specialists.
- (5) Eight launcher crewmen.

c. Equipment authorized the assembly and transport section is listed in TOE's and SNL's appropriate to this type of weapon and unit.

5. General Duties of Personnel

a. *Ammunition Officer.* The ammunition officer commands the assembly and transport section. As the section commander, he is responsible for the tactical employment of the section; assembly, and delivery of checked out rockets to the firing sections; storage and security of rocket motors and warheads, and the overall performance of the section.

b. *Chief of Section.* The chief of section is the non-commissioned officer in command of the section and, as such, is responsible to the platoon commander for—

- (1) Training and efficiency of section personnel.
- (2) Performance of duties listed in this appendix and those prescribed for inspection and maintenance of section equipment including vehicles.
- (3) Transportation and handling of rockets, from the time of issue at the special ammunition supply point

(SASP) to the time of delivery to the launcher section.

- (4) Observance of safety precautions.
- (5) Preparation of field fortifications for protection of equipment, rockets, and personnel.
- (6) Camouflage; discipline; local security; and radiological, biological, and chemical security discipline.
- (7) Maintenance of prescribed checkout and testing records.

c. Senior Assembly Specialists. The senior assembly specialists are responsible for the

handling, testing, conditioning, checkout, and maintenance of rocket motors and warheads for delivery to the firing sections.

d. Assembly Specialists. The assembly specialists assist the senior assembly specialists in the performance of their duties and perform duties listed in this appendix and such other duties as prescribed by the chief of section.

e. Launcher Crewmen. All launcher crewmen are drivers. Four launcher crewmen drive the heating and tiedown units; two crewmen drive and operate the wrecker, and two crewmen are light truck drivers. Additional duties are assigned by the chief of section.

Section III. ROCKET ASSEMBLY

6. General

Rockets are transported from the SASP to the unit rocket assembly position by the assembly and transport section in M78 heating and tiedown units. Each unit accommodates one complete rocket. The rocket motor and warhead may be uncrated at the SASP and transported, with electric blankets installed, on the heating and tiedown unit. Assembly operations consist of uncrating the rocket components (when

required), assembling the rockets on handling units, installing electric blankets, performing electrical checks on the rocket motor and warhead, and delivering assembled rockets to the firing section at the loading position.

7. Duties of Assemblers.

Duties of individuals in assembling the rocket, using the wrecker, are shown in table VII. Figure 7 shows the positions of vehicles for rocket assembly with the wrecker.

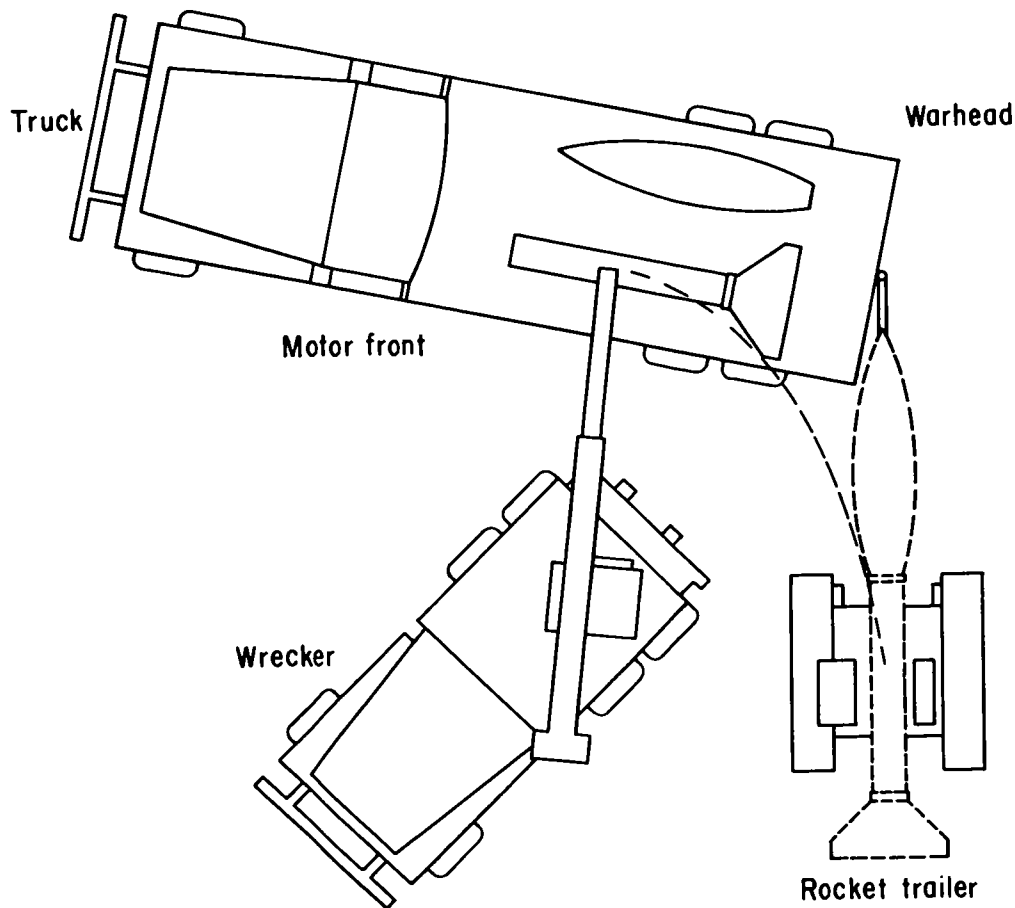


Figure 7. Position of assembly vehicles for rocket assembly.

Section IV. ELECTRICAL CHECKOUT

8. Electrical Checks

Electrical checks as prescribed in TM 9-1340-202-12 are performed in the rocket assembly position before the warhead section is mated to the motor assembly.

9. Electrical Test Equipment

The M17 multimeter is the only circuit tester authorized for use in checkout of the 762-mm rocket motor electrical system. This tester contains a specially designed ohmmeter which uses a $1\frac{1}{2}$ volt battery as its power source. Use of this low-voltage source in the tester eliminates the possibility of accidentally activating the igniter.

10. Rocket Repair

Minor repairs authorized in TM 9-1340-202-12 are made by the assembly and transport sections. Major repairs to the rocket and repairs to explosive components, excluding replacement of components, are made by ordnance personnel.

11. Rocket Assembly and Test Checklist

a. A rocket assembly and test checklist should be prepared by each unit in order to provide continuity of operation. A well prepared checklist will assist commanders in the efficient functioning of the section and should contain the following basic items.

- (1) Rocket component information required by the FDC.
- (2) Essential procedures required in the assembly operations, for example:
 - (a) Rocket component inventory upon receipt of the weapon.
 - (b) Critical steps in assembly, such as the tightening specifications for the warhead mating bolts.
 - (c) Steps in electrical checkout.

b. The amount of detail required in a checklist will be determined by the commander. However, as a minimum, the checklist should contain those items required by the FDC to be used for fire mission computations, and a list of steps and procedures to be used for those operations requiring specific tolerances and specifications.

c. The checklist should accompany the rocket from the time it is assembled and checked out until the time it is fired.

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By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

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For explanation of abbreviations used, see AR 320-50.

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